

MODERN REFRIGERATION

AND AIR CONTROL

Vol. 64 No. 761

AUGUST, 1961

Price 2s. 6d. monthly

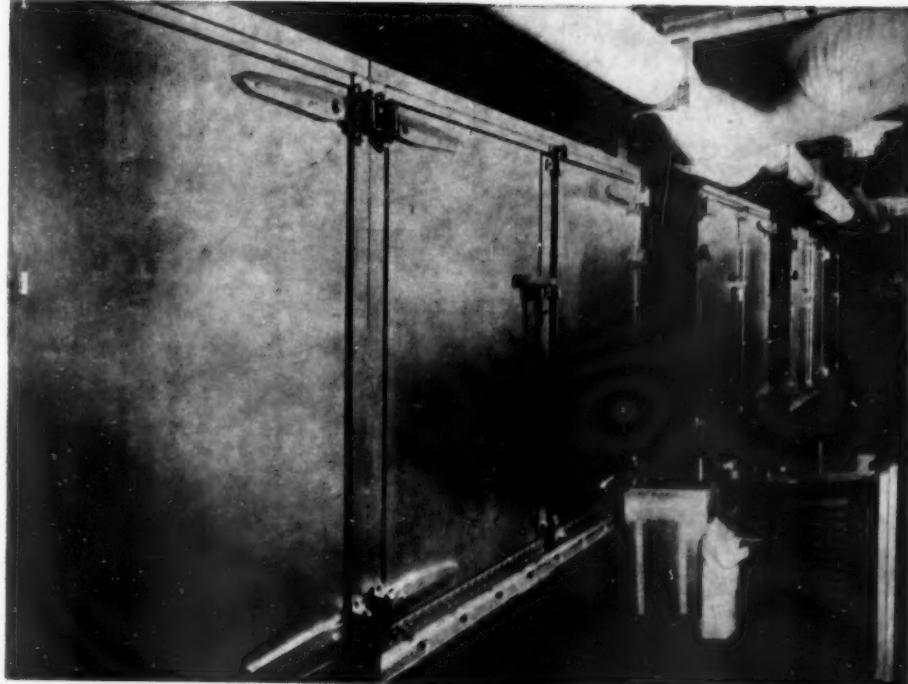
MODERN FREEZING - *FAST*

ASHORE AND AFLOAT

A battery of five multi-plate freezing cabinets were installed on factory trawler ships "FAIRTRY II" and "FAIRTRY III". On each vessel the equipment is calculated to give a throughput of 27 tons filleted fish per day. Jackstone multiplate cabinets have doors at front and back to facilitate through loading and easy maintenance and cleaning.



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Jackstone Froster Ltd.

HUMBER BRIDGE ROAD • GRIMSBY • ENGLAND

**STANDARD
UNIT COOLERS**

**LOW
TEMPERATURE
UNIT COOLERS**

**ELECTRIC
DEFROST**

WATER DEFROST

Types :

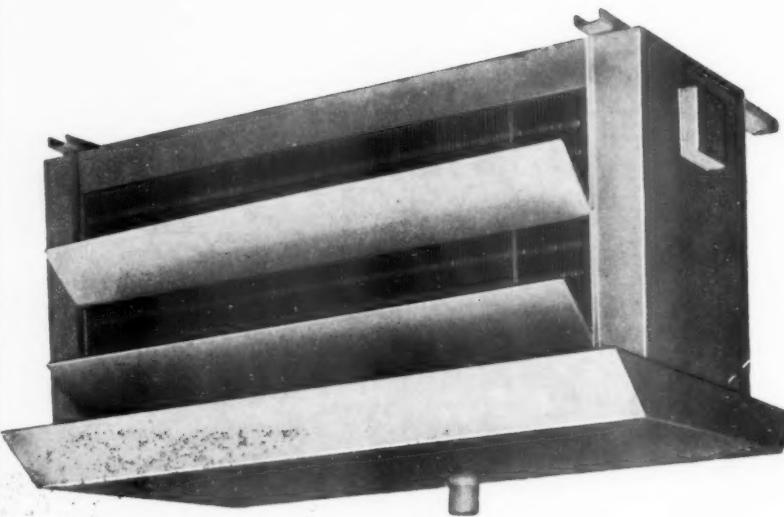
**CEILING
MOUNTED**

WALL MOUNTED

**CIRCULAR
(ceiling mounted)**

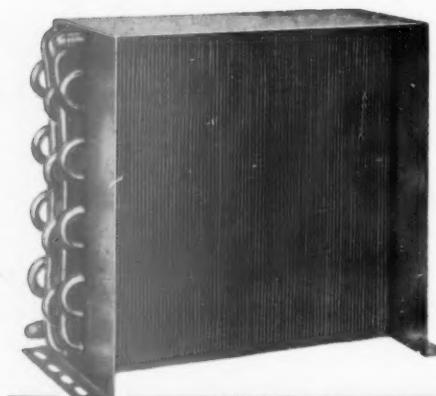
**REACH IN
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CONDENSERS

FOR HERMETIC AND OPEN UNITS



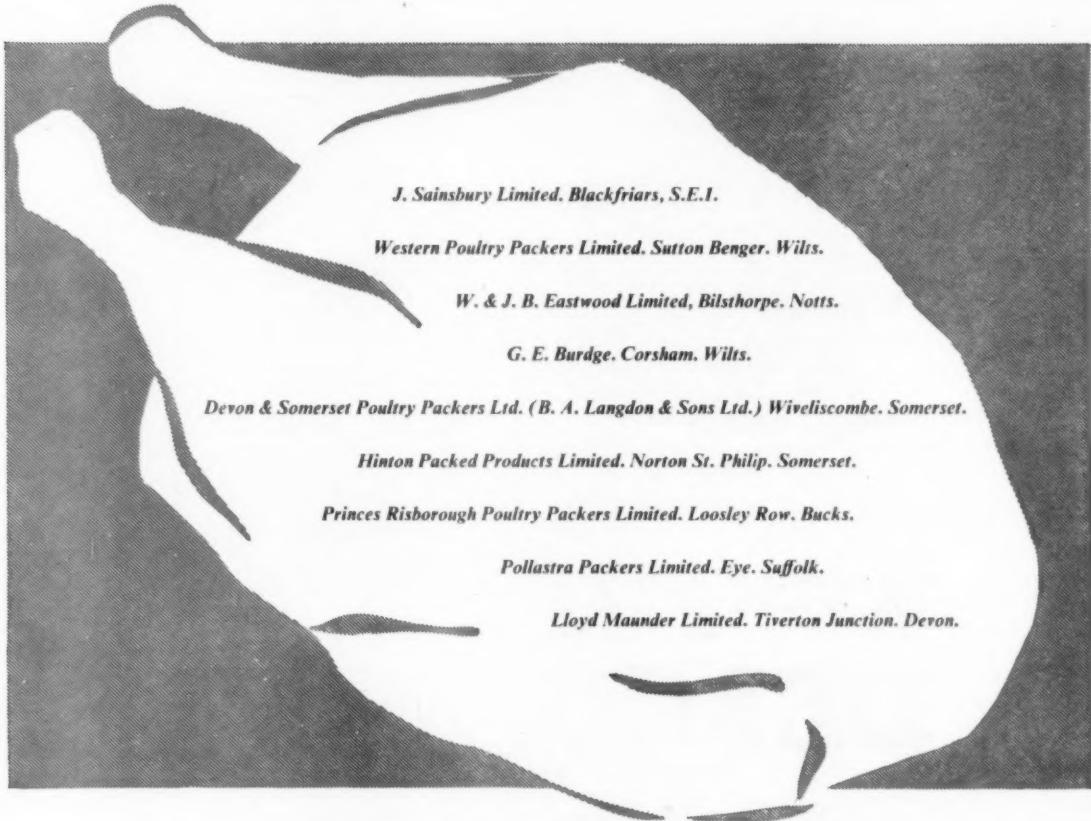
Most Units offered from stock

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Manufacturing HRP Engineers
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**99 KINGS ROAD, CHELSEA, S.W.3
FLAXMAN 1144 (3 LINES)**

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J. Sainsbury Limited. Blackfriars, S.E.1.

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have chosen DOUGLAS QUICK FREEZING PLANT

The DOUGLAS system for QUICK FREEZING poultry
produces a bird of the best possible quality and colour.

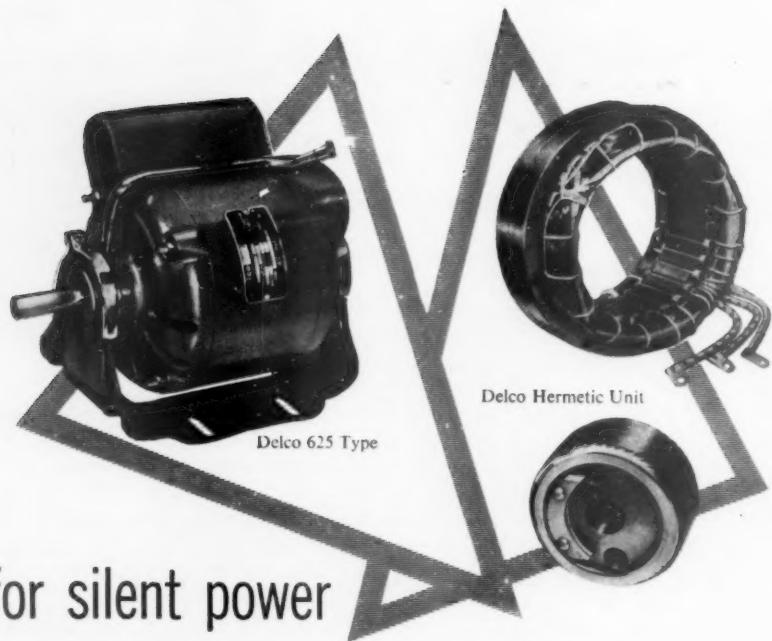
It has been specially designed for its purpose and is arranged to fit readily
into the production line.

It is adaptable to any layout and can be arranged to take care of
expanding output as production grows.

If you want to know more about the Douglas quick freeze system,
(and Douglas dry rendering plant which converts waste,
including feathers, to poultry feeding stuffs), write to:

DOUGLAS

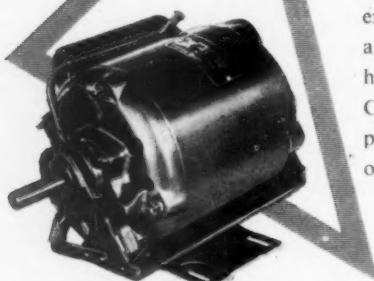
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Delco 650 Type



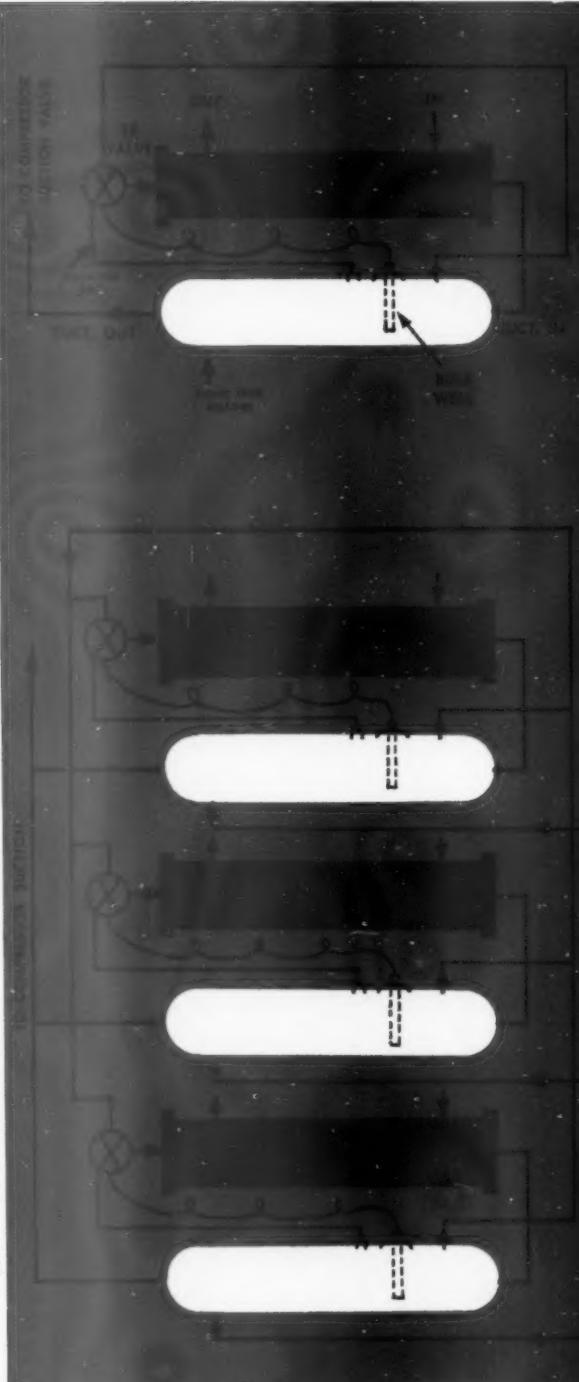
If you are designing new refrigeration equipment or redesigning old, you will find a Delco motor that's just right for the job. In addition to the renowned silent dependability there are exclusive features which make a Delco Motor the obvious choice for high quality equipment. Call in a Delco Engineer now to discuss present and future requirements, or write for further information.

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SRX SUPER HEAT INTERCHANGER

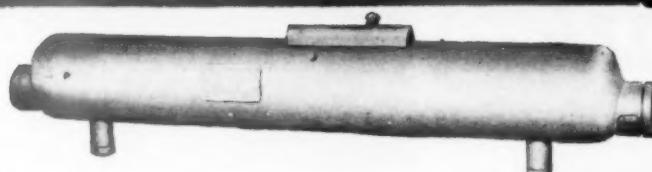
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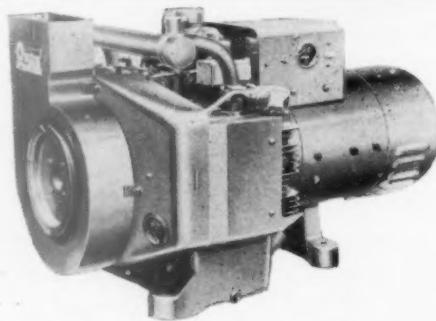
ONAN

THE GENERATING SET **ENGINEERED FOR REFRIGERATED VEHICLES**

Onan Vacu-Flo cooled packaged Generating Sets provide ample power for the operation of electrically driven open and sealed type refrigeration units giving High Performance with long life, minimum operating and maintenance costs.

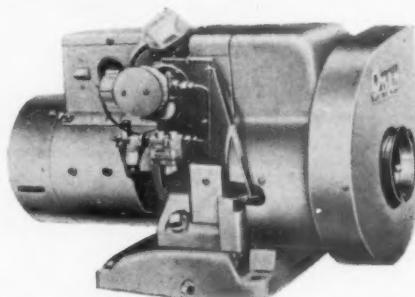
Vacu-flo Cooling System

Exclusive to Onan—overcomes cooling problems in confined space. Cooling air is drawn through and over the generator and engine and exhausted through an outside duct.



ONAN 5CCK Generator with Vacu-flo Cooling gives 5 k.w. of packaged power and will handle refrigeration units of up to 3 h.p. Model 305 CCK meets the requirements of units up to 2 h.p.

LOOK AT THE WEIGHTS—5 k.w. Model ONLY 375 lbs., 3½ k.w. Model ONLY 314 lbs.



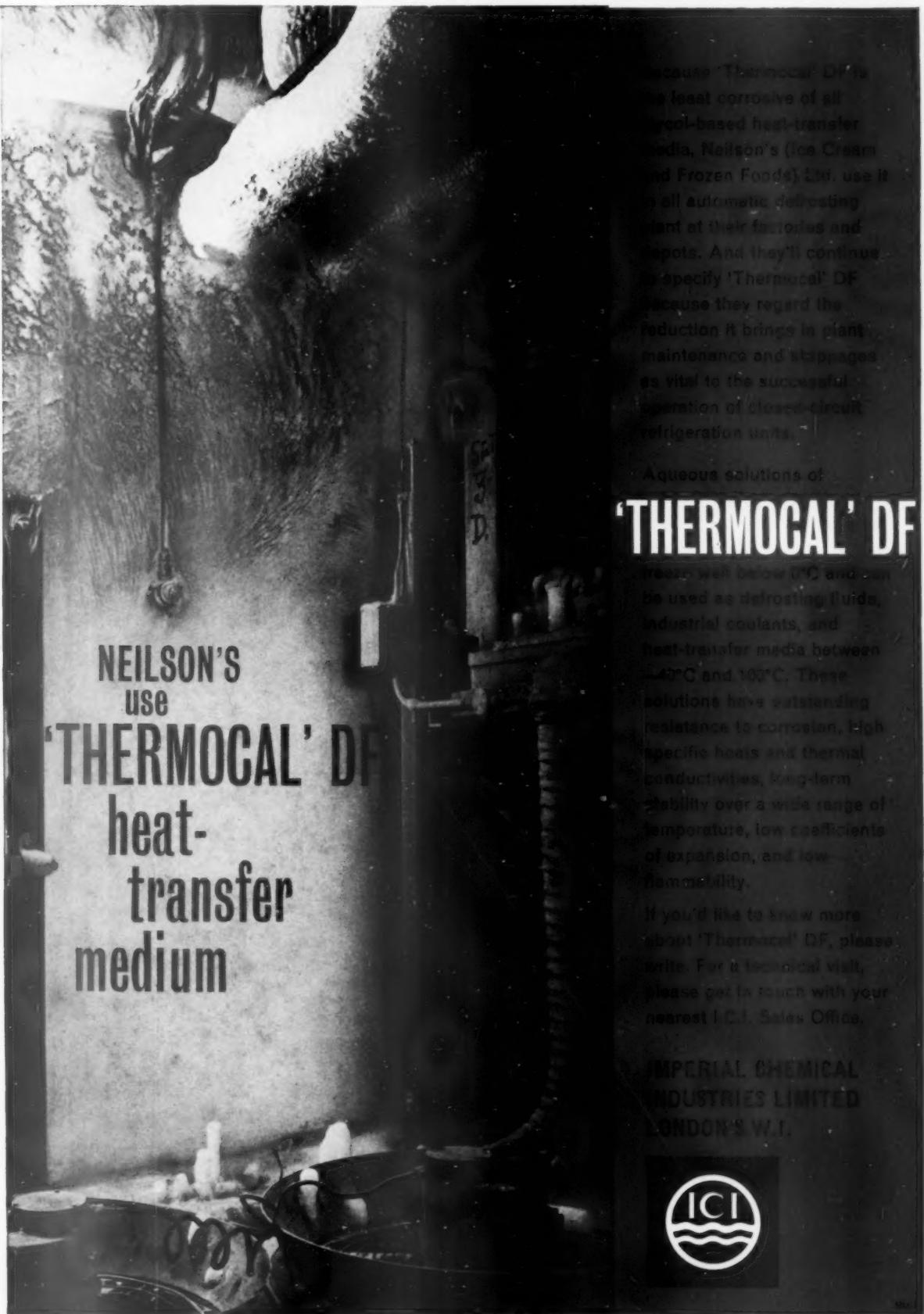
ONAN Model 205AJ-2RV with Vacu-flo Cooling Ideal for mounting in sound-proofed compartment in Refrigerated truck or mobile shop for the operation of Refrigeration Compressors up to ½ h.p. Frozen Food Display Cabinets or for providing power and light for mobile sales and display vehicles. Built for long life and quietness of operation. Full details on request.

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NEILSON'S
use
'THERMOCAL' DF
heat-
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because 'Thermocal' DF is at least corrosive of all hydrocarbon-based heat-transfer media. Neilson's (Ice Cream and Frozen Foods) Ltd. use it in all automatic defrosting plant at their factories and depots. And they'll continue to specify 'Thermocal' DF because they regard the reduction it brings in plant maintenance and stoppages as vital to the successful operation of closed-circuit refrigeration units.

Aqueous solutions of

'THERMOCAL' DF

stay well below 0°C and can be used as defrosting fluids, industrial coolants, and heat-transfer media between -30°C and 10°C. These solutions have outstanding resistance to corrosion, high specific heats and thermal conductivities, long-term stability over a wide range of temperature, low coefficients of expansion, and low flammability.

If you'd like to know more about 'Thermocal' DF, please write. For a technical visit, please get in touch with your nearest I.C.I. Sales Office.

IMPERIAL CHEMICAL
INDUSTRIES LIMITED
LONDON W.I.



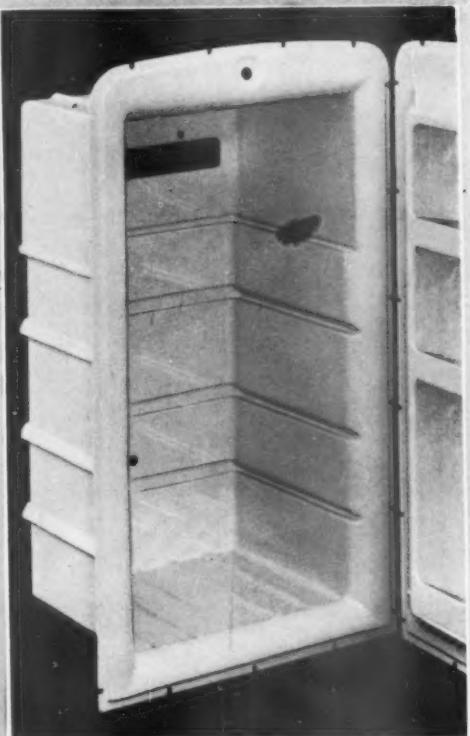
Cooler room at Neilson's main factory, Alfred's Way, Barking.

The complete inner and door lining for
The Astral refrigerator are vacuum formed
in Bextrene toughened polystyrene sheet
by Thermoplastics Ltd., Dunstable.

Bextrene

for toughness

Bextrene (toughened polystyrene) extruded sheet is the cheapest rigid plastic sheet with the highest yield. Its easy formability makes it particularly suitable for vacuum-forming. Uses include refrigerator liners, radio and TV components, display and semi-rigid packaging materials. Supplied in rolls, sheets and panels from 0.010 in. to 0.180 in. thick and up to 48 in. wide. Standard stock sheets 54 in. x 26 in.



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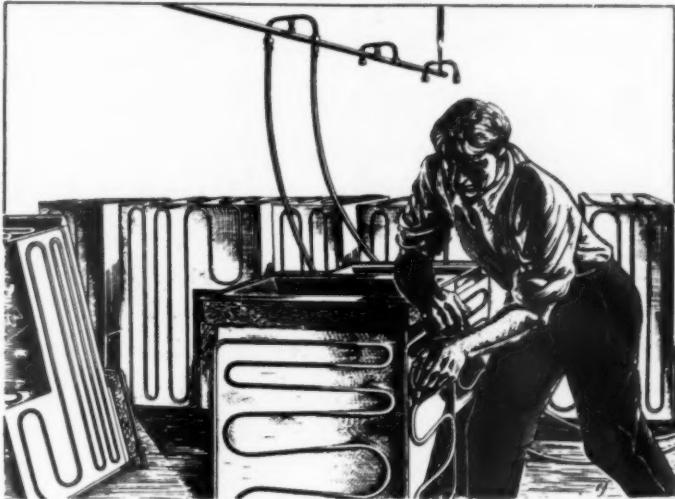
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TA 5336

August 1961 MODERN REFRIGERATION

**YORKSHIRE
IMPERIAL**

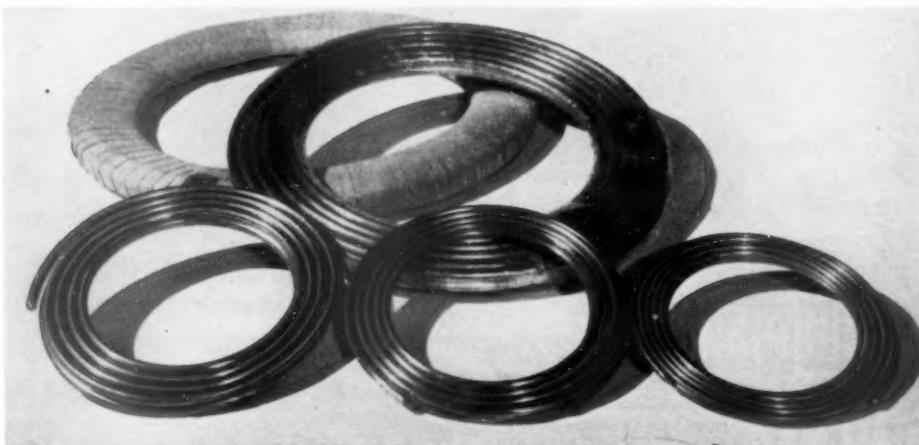
*Refrigerator
Tubes
ensure a
first-class product*



When you order *Yorkshire Imperial* you are assured of high-quality refrigerator tubes with clean, smooth bores, dehydrated, and delivered in sealed coils of the correct temper. They are double-wrapped and will remain in first-class condition until you are ready to use them.

The tubing is coiled in double pancake coils in 20 ft., 50 ft. and 100 ft. lengths—or supplied in straight lengths—and when required can also be tinned on the outside.

Yorkshire Imperial also manufacture restrictor and bulb-and-capillary tubing—and a range of special "Yorkshire" Fittings for refrigeration work.



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protection
is not enough

DUPAR
DOUBLE
SAFETY
is
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in the
OUTSTANDING
TFK STARTER



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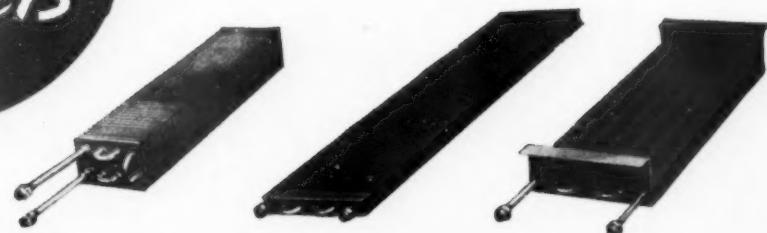
- Range: $\frac{1}{2}$ - $7\frac{1}{2}$ h.p. 3-phase a.c.
- Simple overload dial setting and external reset.
- Neon running indicator.
- Dust and damp proof indestructible steel case.
- Chassis construction for easy maintenance.
- Reversing and non-reversing types available.
- Ammeter, H.R.C. fuses, isolator, also available.
- Sustained high performance satisfies the most critical installations.

Specification leaflet 202E gives full
details — ask for your copy now!

DP/HI

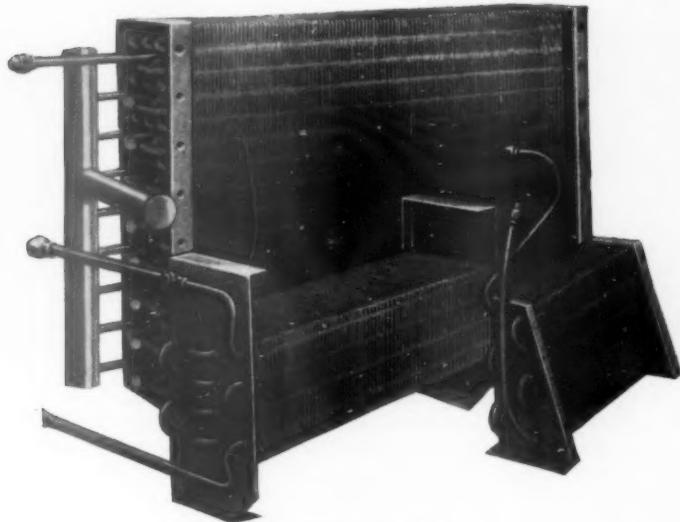


**Manufacturers of Coolers and
Condensers for Commercial,
Industrial Refrigeration and
Air-Conditioning Applications**

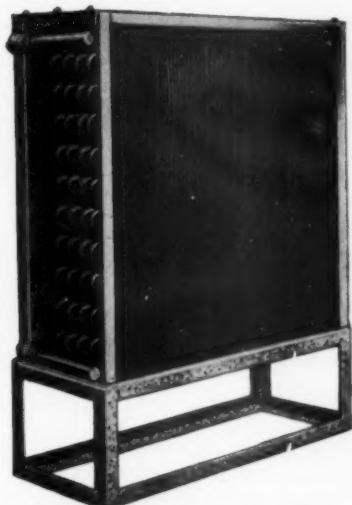


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FOR :—DISPLAY CASE, COMMERCIAL and INDUSTRIAL APPLICATIONS



**FINNED COOLERS
FOR AIR-CONDITIONING APPLICATIONS**

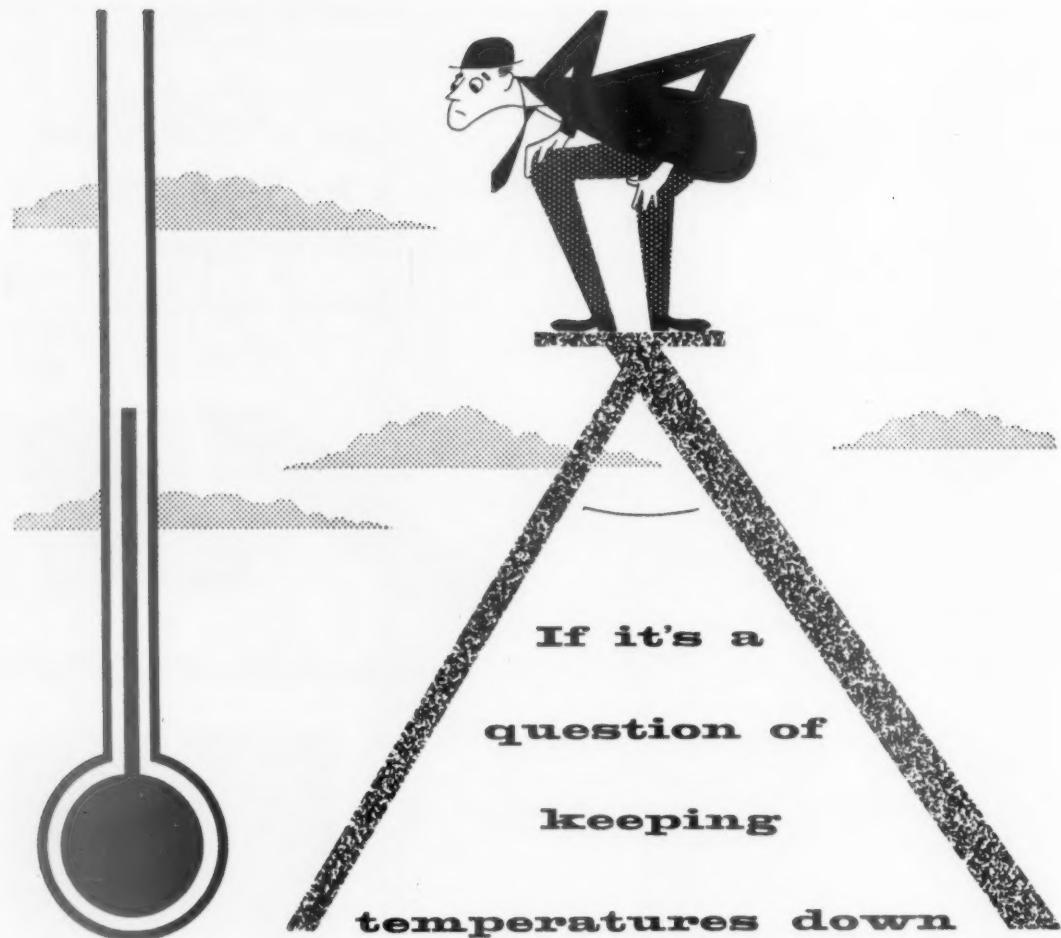


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AIR COOLED CONDENSERS**

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Telephone No. AMHerst 9747-8-9 Telegrams: CHILLYHACK, LONDON



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Newalls supply and apply low-temperature insulation materials and their service is available through each of eight depots situated throughout the United Kingdom. When the specification calls for a first class job, call in Newalls.

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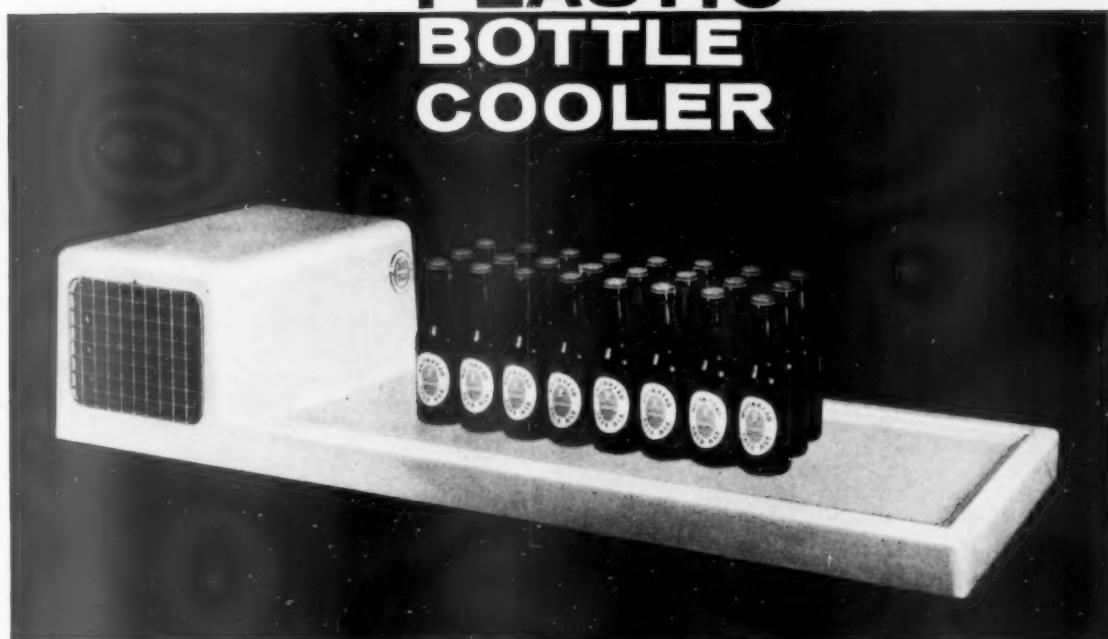
Agents and Vendors in most markets abroad.

45



USING THE GLASS FIBRE
LIFEBOAT PRODUCTION TECHNIQUES

the SANDOWN MOULDED PLASTIC BOTTLE COOLER



This attractive Bottle Cooler is of one piece streamlined glass fibre construction which gives a smooth eye-catching finish, all joints and sharp corners being eliminated in the design so that it can be easily kept clean simply by wiping with a damp cloth. The unit is completely mobile being both light in weight and self-contained, requiring only connection to the electricity supply to bring it into operation. Sizes available 5' x 2' (144 half pint bottles) and 6' x 2' (194 half pint bottles). Condensing unit is a one-fifth horsepower Kelvinator wound for 230 volts, 50 cycle, single-phase supply.

J. SAMUEL WHITE & CO. LTD.

REFRIGERATION DIVISION

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- * Thermo King is the world's most experienced manufacturer of transport refrigeration units.
- * The units are powered by a self-contained engine. Models are also available with combined engine and electric power or with electric motor only.
- * Exclusive patent starter generator provides a money saving start or stop engine operation.
- * The unit cuts in and out to maintain any desired temperature which automatically is thermostatically controlled.

- * Air is drawn from the cargo space then blown through the cooling coil and around the cargo.
- * The same convection principal is used to keep perishables warm in cold weather—the snap of a switch converts the coil from refrigeration to warming.
- * Designed to combine strength with lightness.
- * More cooling per pound of equipment than any other mechanical system.
- * Ease of fitting—large units fixed by 6 bolts, small units by 4 bolts.
- * The complete unit fits into a rectangular opening in the front of the body. This type of installation does not reduce the load space.
- * Uninterrupted use of the vehicle is ensured as the Thermo King unit can be replaced in a few minutes for routine overhaul on the shop floor.

"AND
SIMPLEST
TO OPERATE!"

One of the largest articulated refrigerator vehicles in the country, operated by J. Lyons & Co. Ltd., has a Thermo King, Model RL20 installed. The body, which is on a Crane semi-trailer, was constructed by Normand Ltd.



SERVICE FACILITIES
* THROUGHOUT GREAT BRITAIN
AND THE CONTINENT

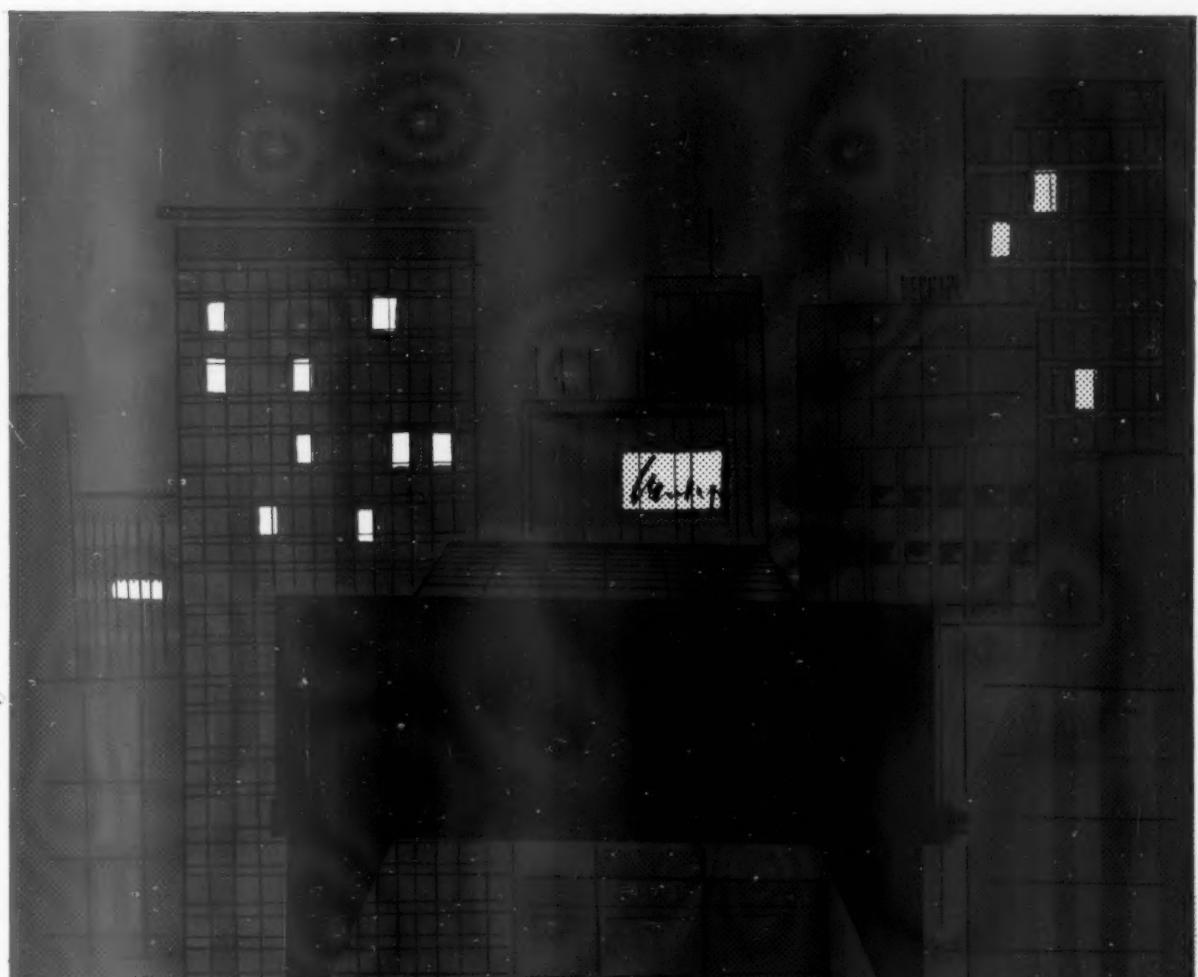
PETTERS LIMITED

A MEMBER OF THE HAWKER SIDDELEY GROUP

THERMO KING

* PIONEERS IN TRANSPORT REFRIGERATION

PETTERS LIMITED • HAMBLE • SOUTHAMPTON • Telephone: HAMBLE 2061



LOW SILHOUETTE BLOWER CONDENSER

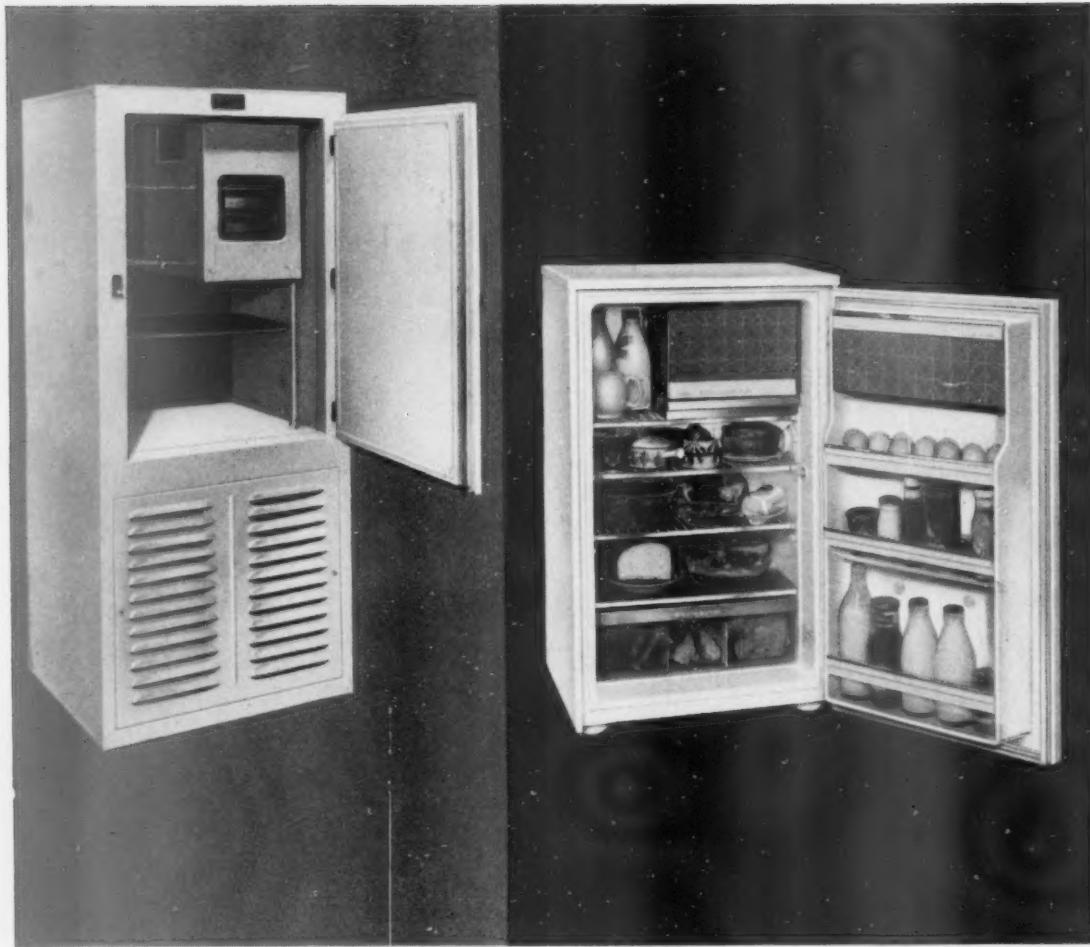
offering high performance and exceptional flexibility

Here is a Blower Condenser that can be located anywhere without regard to prevailing winds . . . the Searle-Bush 'LSBC'. Designed for maximum performance within minimum space, the low silhouette offers great flexibility in installation sites. The air movement, up and out, means minimum noise rating. The 'LSBC' shape allows for location on most roofs with a safe pounds per square foot loading, eliminating costly reinforcing of roof members necessary to support the weight of other types of units. The 'LSBC' is available in fifteen models from 5 to 85 tons.

For further details please write for Bulletin 7001.

SEARLE-BUSH

SEARLE MANUFACTURING COMPANY LIMITED LONDON AND FAREHAM



Reproduced by courtesy of Frigidaire Division of General Motors Ltd.

You learn a lot in 29 years...

- * Only practical experience could have made possible the great improvements between the refrigerator of 1932 and 1961.
 - * For much of that time Eko Plastics have been closely associated with the refrigeration industry, contributing to many advances in construction and design.
 - * This, undoubtedly, is a major reason why Eko Plastics can, and do, solve so many problems for so many refrigerator manufacturers—in a sound and practical way.
- We too have learned a lot in 29 years. Our experienced designers and engineers will willingly discuss your plastics problems—entirely without obligation.*

EKO PLASTICS LTD • SOUTHBEND-ON-SEA • ESSEX

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**EKO
PLASTICS**

**for the
Refrigeration
Industry**

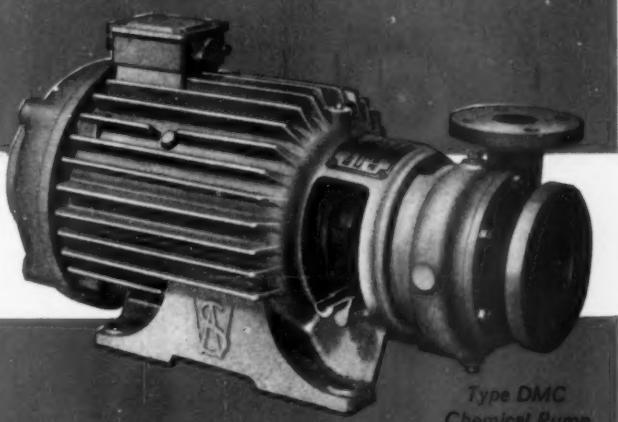
4 BIG ADVANTAGES OF WORRINGTON-SIMPSON 'MONOBLOC' PUMPS

space-saving 'Monobloc' construction ensures easy installation and perfect alignment.

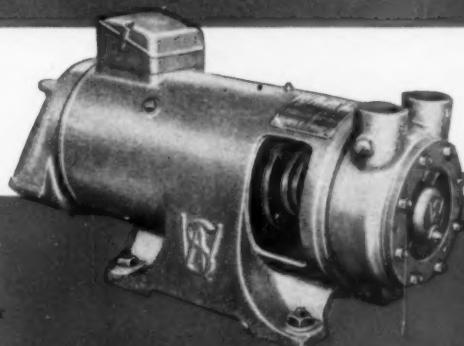
2 comprehensive range of sizes — from 3 to 1,200 g.p.m. — heads up to 210 feet — 45 sizes of motor.

3 freedom from vibration.

4 range of stainless steels available for handling liquors without risk of contamination.



Type DMC
Chemical Pump



Type TM Vortex Pump

Other Worthington-Simpson equipment for industry includes:

VORTEX PUMPS

— for boiler feed service and many other applications requiring high heads and limited capacities.

VERTICAL SIMPLEX AND HORIZONTAL DUPLEX PUMPS

— ideal stand-by pumps for boiler feed services.

NON-LUBRICATED AIR COMPRESSORS

— for oil-free air supply.

CONDENSING, FEED-HEATING AND DE-AERATING PLANT

We shall be glad to send technical literature containing full specifications.



Worthington-Simpson Ltd

NEWARK NOTTS

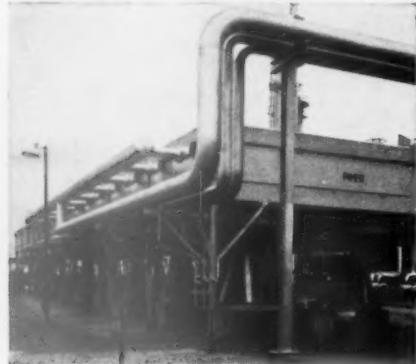
PUMPS · COMPRESSORS · HEAT EXCHANGE EQUIPMENT

'INTEGRON'

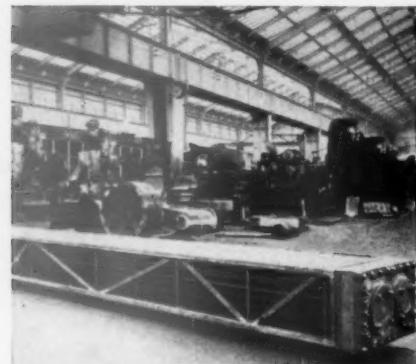
the tube with the integral fin

Reliable, efficient—VERSATILE, TOO!

For heat exchange tubing, absolute reliability and maximum efficiency are essential. ICI 'Integron' combines them with impressive versatility—a wide choice of materials, fin heights and spacings, tube diameters and finishes.



More than 150,000 ft. of 'Integron' M.F. aluminium finned tubing is used in the air cooled condensers of the Powerformer unit at Fawley Refinery. Built by A. F. Craig & Co. Ltd. and supplied to Esso Petroleum Co. Ltd. by Hudson Engineering Corporation.



'Integron' High-fin copper tubing is used in the gas coolers of hydrogen cooled generators built by C. A. Parsons & Co. Ltd. Each stator casing has four coolers mounted longitudinally in the upper half of the casing behind the core.

INT 13

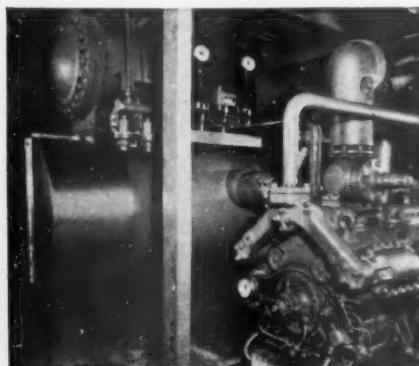
For instance—

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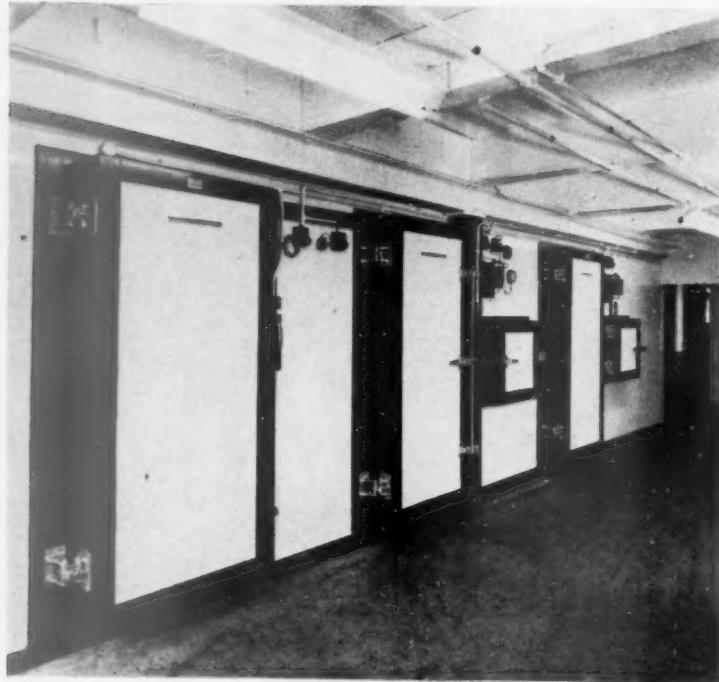
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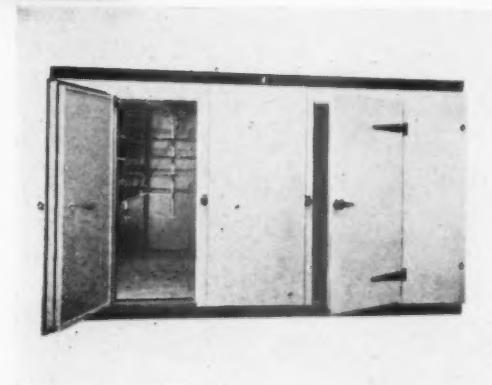


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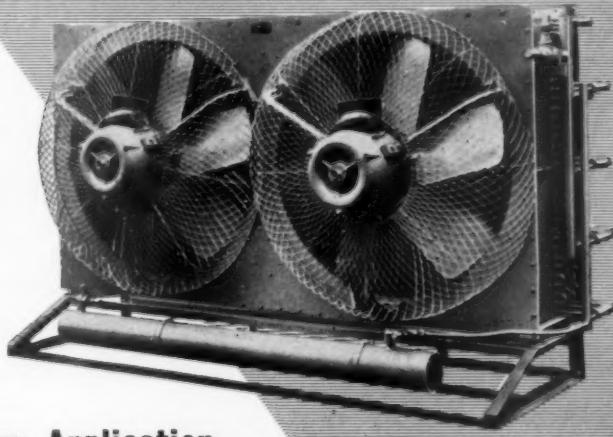
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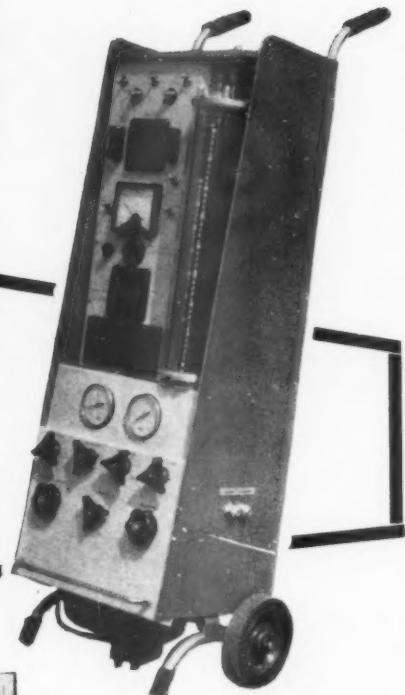
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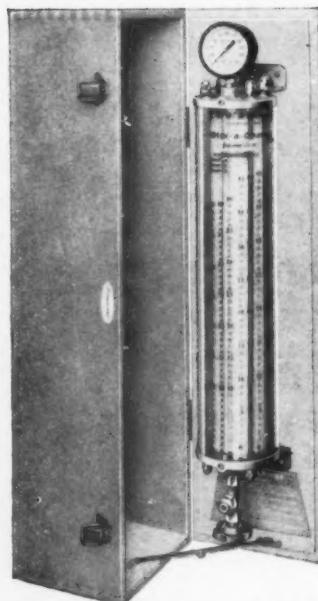


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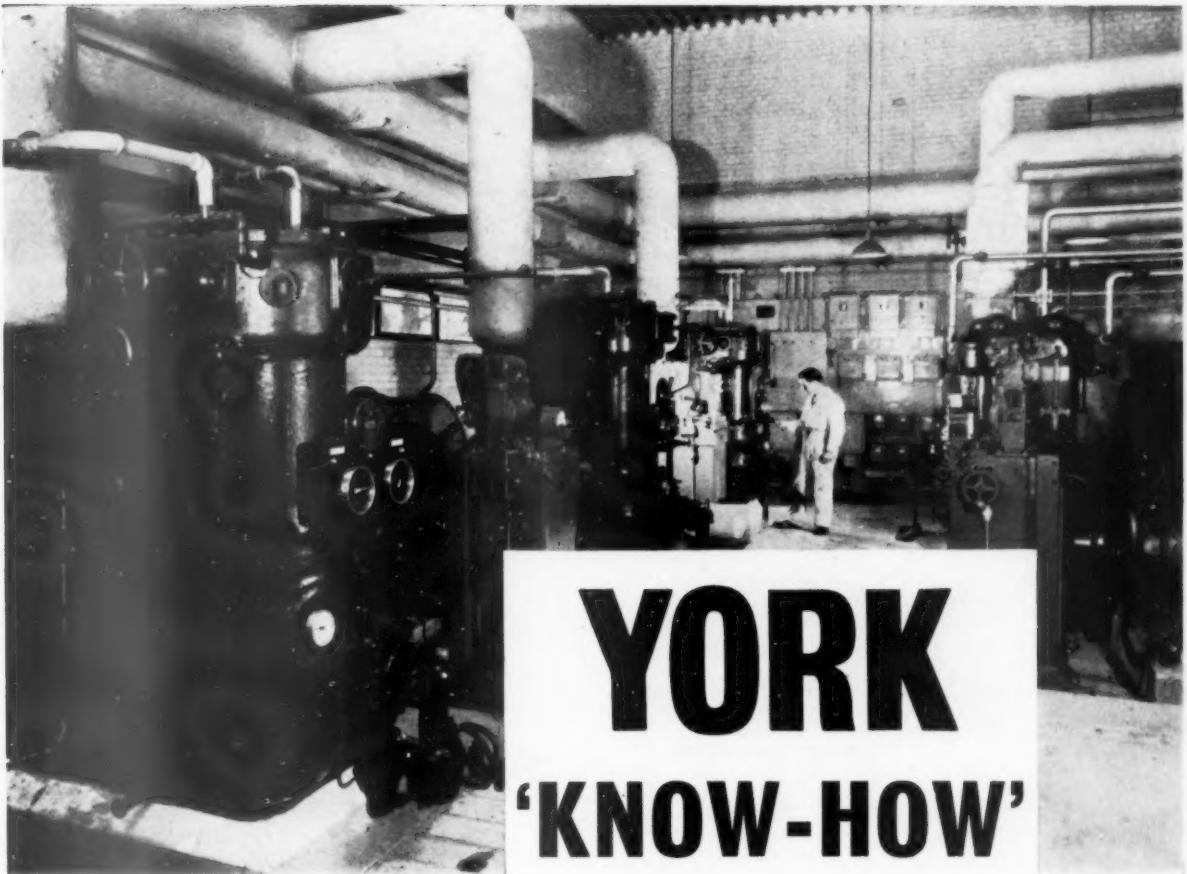
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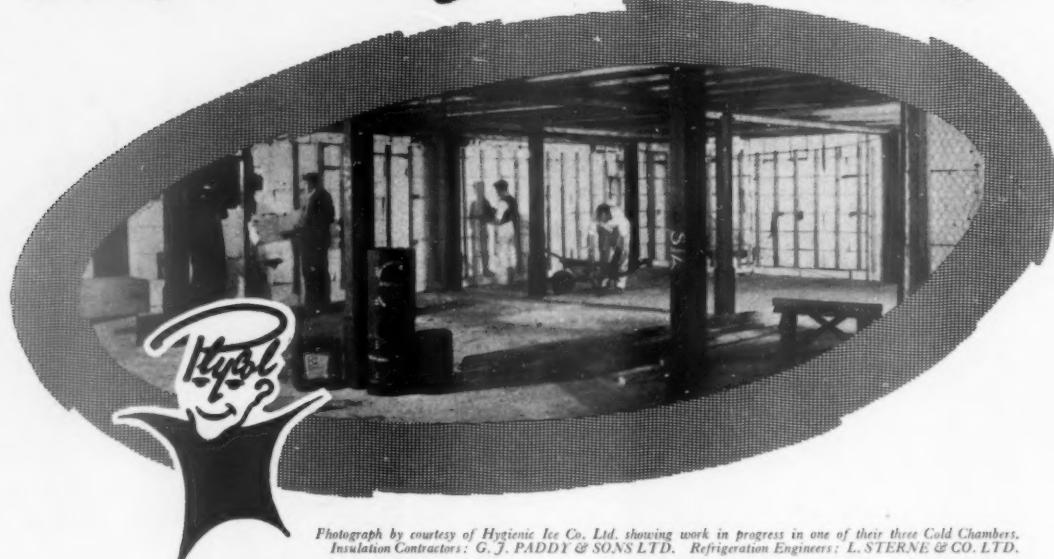
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P.5134

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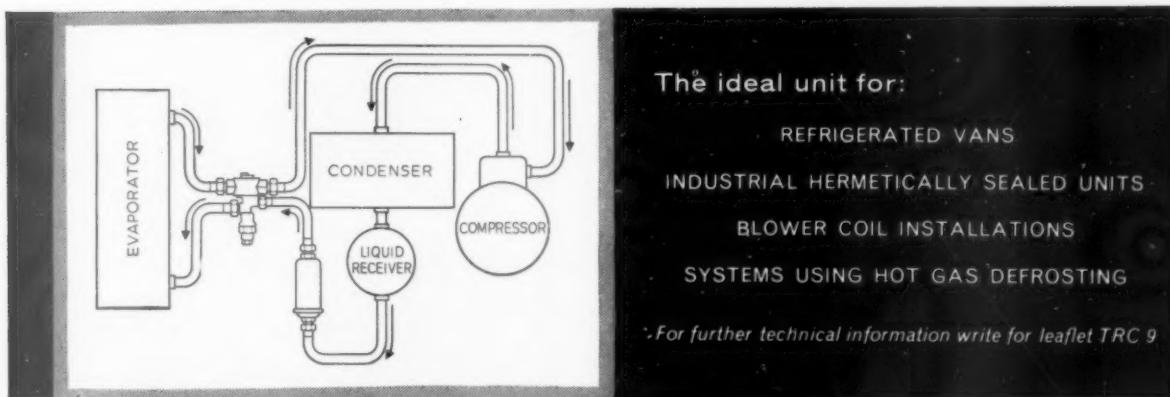


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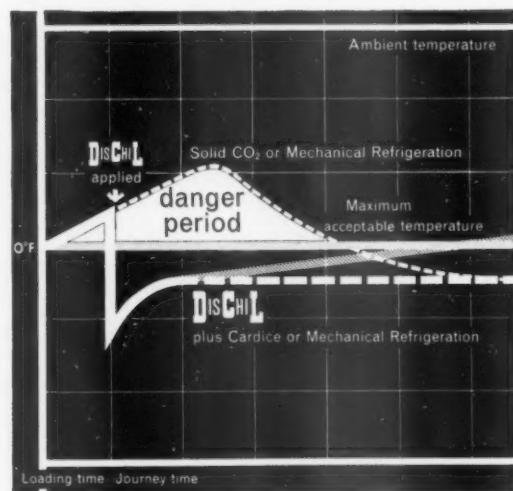
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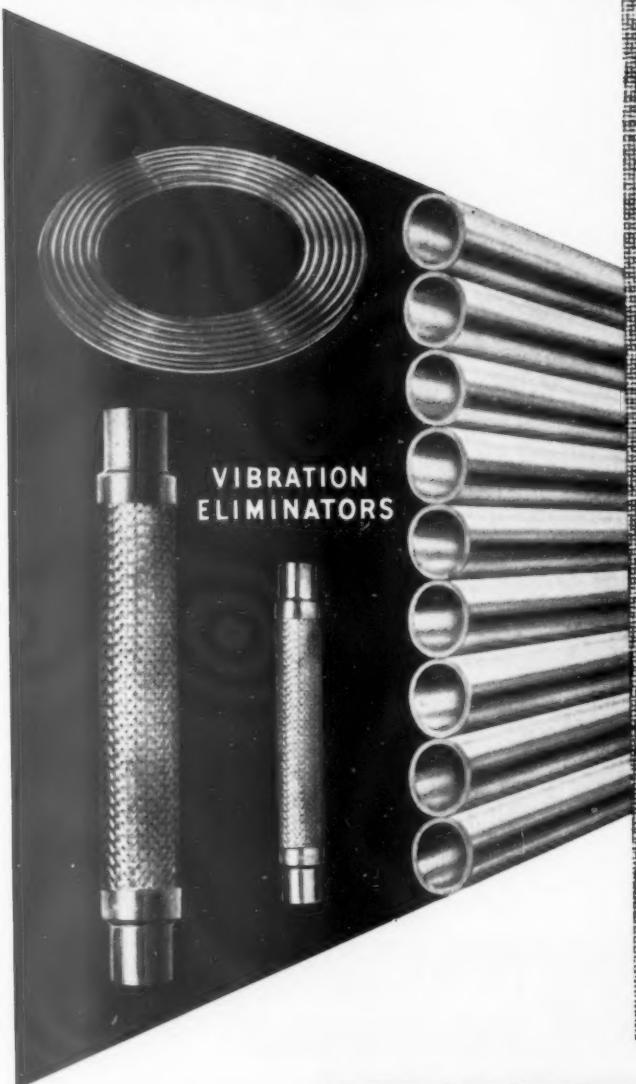
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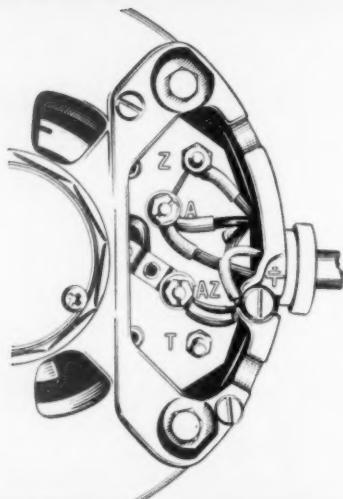
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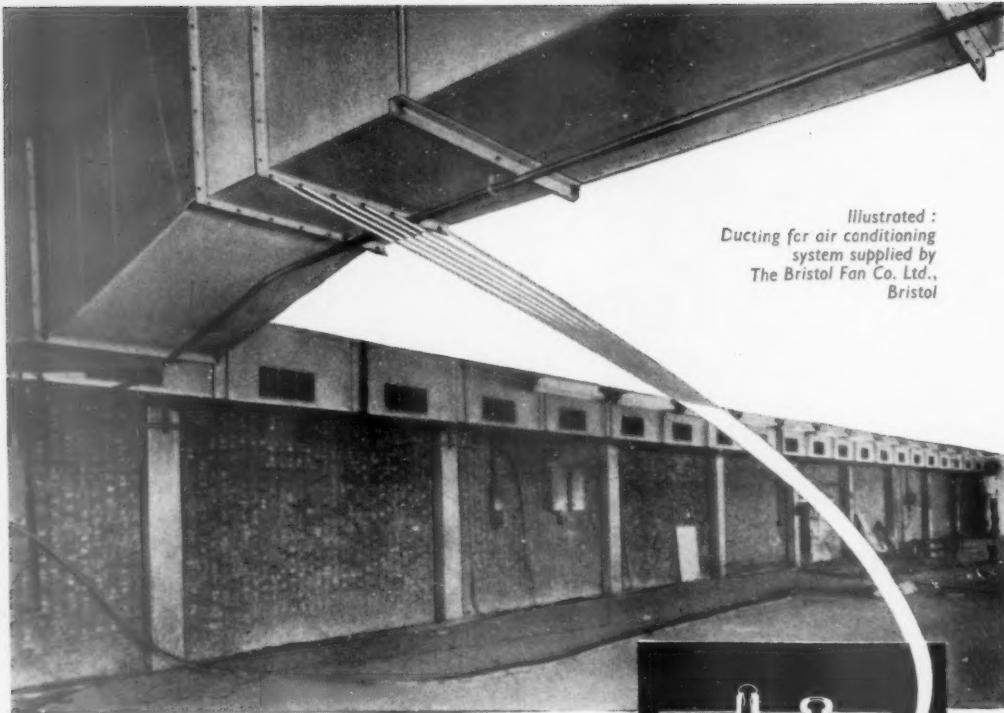
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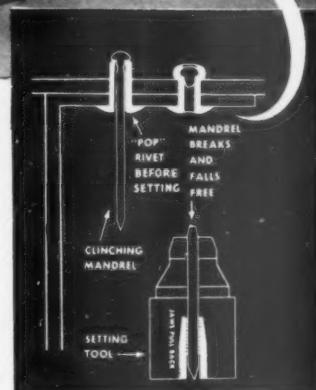


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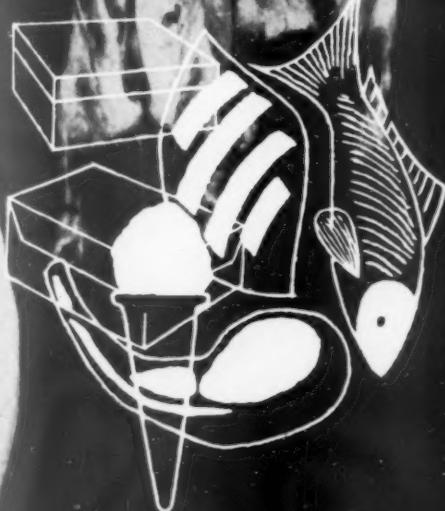
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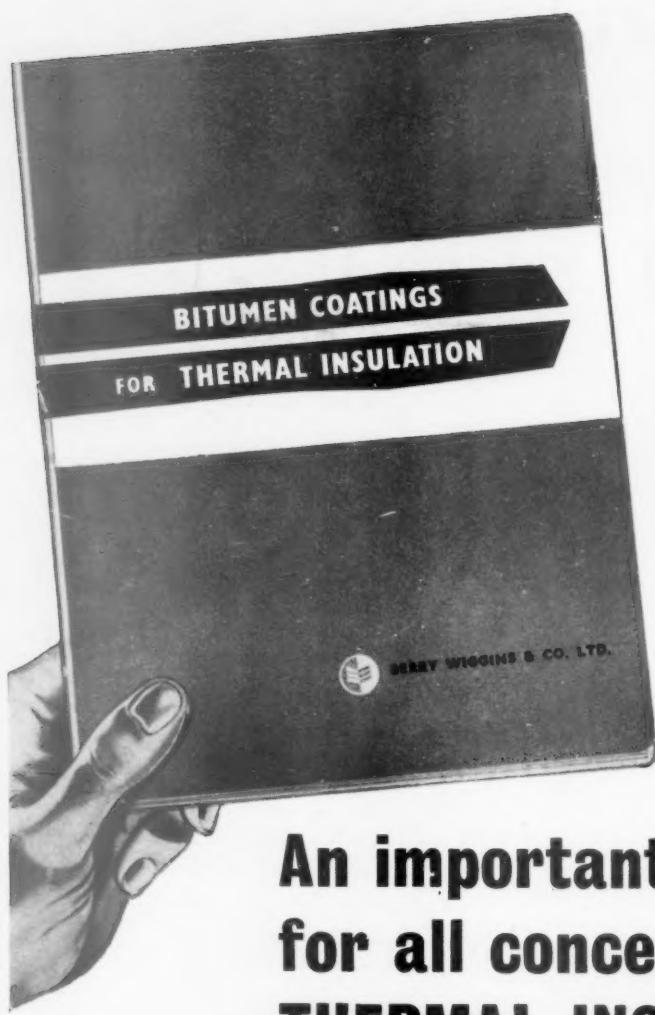
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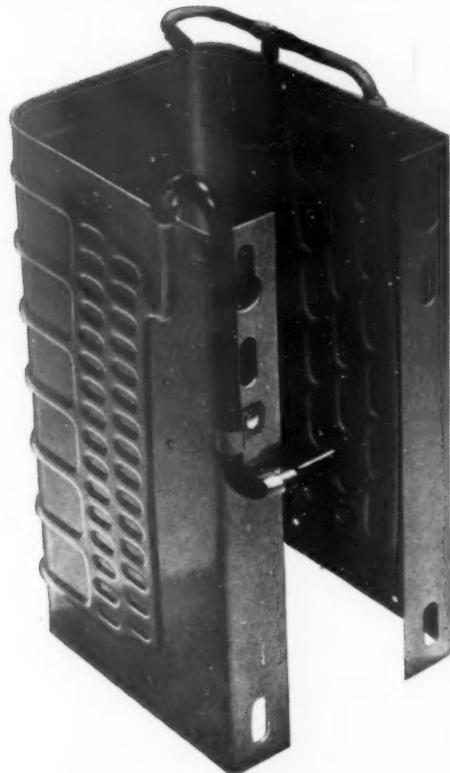
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MAR. 298

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WANTED: small quantity of used 4 - 10 c.ft. Zero Storage Cabinets (sealed units preferred). State make, price and condition.—Box 331. 331

L ARGE Ammonia compressors wanted, Alfred's Ices (1954) Ltd., 3 Hall Place, W.2. 288

A MMONIA REFRIGERATION COMPRESSORS and accessories by Hall, Sterne, Lightfoot. Capacities 10 lb. upwards. Offers to: G. W. A. JONES, 15, Lancaster Gate, London, W.2. PAD 4317. 322.

AGENCIES, REPRESENTATIVES ETC.

6d. per word. Minimum 12/6. Box 2/- extra.

E XPERIENCED Commercial Sales Representative required to promote Sales of Frigidaire refrigeration South Coast. Remuneration by means of salary, commission and out-of-pocket expenses. Company car supplied. Reply in strictest confidence.—Box 328. 328

*World's Leading Vending
Machine Manufacturers are
looking for*

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Established Commercial Refrigeration Companies with
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HOT AND COLD DRINK MACHINES

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AUTOMATIC CANTEEN

BUILT-IN WINDOW VENDORS

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All Spares Available
Companies only with Established Leading Agencies

BOX 344

MANN EGERTON, the leading manufacturer of refrigerated transport, have a vacancy for a sales representative. Applicants should have a good knowledge of commercial refrigeration, and experience of selling, not necessarily in the refrigerated transport field. The successful applicant will work closely with the Chief Development Engineer and, although based in Norwich, will have to travel extensively throughout the country. Salary and commission commensurate with age and experience. Pension scheme. Excellent prospects. Apply in writing giving full particulars of qualifications and experience to The Director, Mann Egerton & Co. Ltd., Cromer Road, Norwich.

327

MISCELLANEOUS

6d. per word. Minimum 12/6. Box 2/- extra.

POLYTHENE Coated Steel Shelves, Freezer and Supermarket Baskets, Hygienic Corrosion Proof White Polythene. Special Discounts for Quantities. Richard Craven & Co. Ltd., Camwal Road, Starbeck, Harrogate. Telephone 84484.

203

TRADE SERVICES

6d. per word. Minimum 12/6. Box 2/- extra.

QUALIFIED REFRIGERATION ENGINEER would act as Consultant, prepare Estimates, Designs, Technical advice. A complete Consultant Service for the small Company.—K. G. Hobbs, A.M. ASHRAE., A.M.INST.B.E. A.M.INST.R., Tel.: PRImrose 4487

83

TRADE repairs and overhauls all types of equipment. Sealed Unit Mechanisms a speciality.—Wilde & Clayton (Refrigeration) Ltd. Forest Hill 8851.

341

SERVICE & REPAIRS

6d. per word. Minimum 12/6. Box 2/- extra.

REPAIRS overhauls and general maintenance effected for the trade. Specialists in absorption and Sealed Unit Mechanisms. The A.C.R.E. Company, 389 Green Lanes, London, N.4. MOU 0171/2.

229

BUSINESS FOR SALE

6d. per word. Minimum 12/6. Box 2/- extra.

FOR SALE—Cold Storage business—North West area comprising: 50,000 c.ft. 12/16°; 20,000 c.ft. minus 5; 20,000 c.ft. Chill Room; Blast Tunnel minus 20—2 tons capacity, also good dry storage space available. Details from Box 311.

311

COMMERCIAL and Industrial Refrigeration Engineering Business for sale. Large showrooms, offices, workshop, garage and living accommodation. Centre of South Coast town. Lease, goodwill and equipment £2,500 S.A.V.—Box 325.

325

BUSINESS PROPOSITIONS

6d. per word. Minimum 12/6. Box 2/- extra.

REFRIGERATION Company in process of formation, centred expanding industrial Tees-side, wishes to hear from reputable manufacturers of domestic, commercial, industrial and air-conditioning equipment, with view to concluding distributor agreement.—Box 337.

337

IF YOU FEEL
Inclined
TO CUT COSTS
take it *Easy!*
Rest
Assured - with
WOLVERINE TUBING

THE MOST ATTRACTIVE ECONOMISER IN THE TRADE. YOU CAN SAVE MONEY IN YOUR ORGANISATION, THE SIMPLER, MORE LOGICAL WAY. TRY IT NOW!

This clean, mirror-finished copper tubing, comes to you sealed and dehydrated in 25 or 50 foot coils, individually packed in neat cartons and at prices lower than ever before, with special discounts for large users. Inspection soon proves that quality has not been sacrificed to achieve the economical price. It's made by one of the most famous manufacturers in the world, so it's distributed by PERFECTION PARTS LTD. 59 UNION STREET, SOUTHWARK, LONDON, S.E.1. HOP 4567 (4 lines)

Designed to meet the demands of retailers in almost every trade, this large-capacity Secura counter will enhance the appearance of any shop, stimulate more sales and pay for itself out of extra profits. The ideal height of counter encourages customers' selection and speeds service. Two models available (for either refrigerated or non-refrigerated base).



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*This Secura Counter
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show more, sell more
and pay for
itself - quickly!*

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EXPANDED POLYSTYRENE

SPANDOPLAST



SLAB and SECTION

THE IDEAL INSULATION MATERIAL FOR REFRIGERATED VEHICLES

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THE BAXENDEN CHEMICAL COMPANY LIMITED
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MODERN REFRIGERATION

and Air Control



Incorporating
COLD STORAGE AND PRODUCE REVIEW
and ICE AND COLD STORAGE.

Established 1898

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Editorial...

Government Formula for Exports—
"Hit 'em hard at home"

A Refrigeration Lead into Europe

More Fruit Transport Tests

● Piling agony upon agony the Chancellor dealt another blow at the valiantly-struggling appliance industry with his 10 per cent. purchase tax increase. On a popular 4·1 c.ft. refrigerator retailing at £67 3s. 6d., the increase is £1 0s. 6d., to quote one example. The well-known Dundee refrigerator-producing firm, however, have declared that the 10 per cent. increase in purchase tax will be absorbed on all their refrigerators with the exception of one compressor version. The price of this model is increased by one guinea—from 66 gn. to 67 gn. The purchase tax increase is being absorbed by the company on 10 refrigerator models. Similar news comes also from Swansea.

● A measure of crystal-gazing must have been indulged in by British refrigeration manufacturers for they have been attending meetings of the Comité Européen des Constructeurs de Matériel Frigorifique (C.E.C.O.M.A.F.) for many months now and are already on excellent terms with "The Six."

● Following hard upon the news last month that extensive trials were in progress to improve the carriage of that delicate "traveller," the strawberry, comes word that the Scots have turned their attention to the raspberry that flourishes in Perthshire. Precooling and overnight transportation of raspberries from the Tay Valley area has been a success, limited only by the current shortage of raspberries because of adverse weather conditions. The Horticultural Marketing Council established a depot at Coupar Angus in July to precool and tranship by road to London and Brighton. The raspberries were packed into special containers, precooled and then shipped by special road transport, still cooled, to the London and Brighton markets, where response was most satisfactory. British Railways also carry considerable quantities of raspberries in season and have been co-operating with the growers to provide special trains. They also carried out precooling and refrigerated shipment work in late July, and this too was highly successful. Retailers receiving these precooled and overnight -shipped soft fruits commented on the very excellent quality, regarded by some buyers as the best seen in their area. Success of this development could mean a substantial extension of raspberry marketing in the south of England, although high costs of equipment puts it outside the scope of the ordinary grower. Co-operative purchase and operation of precooling equipment might meet this situation although the high cost of containers for transportation could well limit the growth of the trend. Full value of the experiment and future scope for precooling and refrigerated transport remain to be seen, after the season's figures are assessed.

● Meanwhile, raspberry growers in the Tay Valley area have turned increasingly to co-operative operation. Perth and Angus Fruit Growers Ltd., the co-operative formed to run raspberries and strawberries to the English markets, used special trains in late July, after the earlier practice of coupling up to meat and fish freight trains did not always make markets as required.

● The distribution of goods from the manufacturer through wholesale and retail channels to the consumer affects the whole pattern of life today, and determines to a large extent the standard of living. In a new book entitled "The Changing Pattern of Distribution," the authors examine the development of the methods of distribution, the changes currently taking place and their causes, and the future patterns which may establish themselves. What are the lessons of the phenomenal post-war rise in disposable incomes? Are today's consumers more discriminating? How far is mass consumption a reality? What are the true relationships between price, quality, service and variety? How many market levels are there? How important is merchandising and personal salesmanship? Will the proportionate cost of distribution go up or down if our standard of living continues to rise? These are some of the questions which the authors seek to answer. £15,500,000 were spent by consumers in 1959 on all goods and services, and it is argued that while improved manufacturing techniques are producing considerable savings, they are not fully effective because potentially substantial economies in distribution are being lost through neglect in examining and rationalising the distributive chain. This work is worthy of study by the refrigeration industry.

● It is rumoured that research men are trying to devise a means of automatically conveying those precooled frozen dishes from the kitchen to the lounge so that the TV-goggling family need not interrupt the evening's viewing. These TV meals are now being extended in scope by the efficacy of a natural gum marketed as "Colloidan." Colloidan makes it possible to freeze emulsions, that is to say, mayonnaises, dressings, salads and sauces, having an oil content of up to 50 per cent. by the quick-freezing process.

● A wedding gift of an Electrolux gas-operated model L.40 refrigerator has been presented by directors of that company to their Royal Highnesses the Duke and Duchess of Kent and is now installed at their home, The Coppins, Iver, Bucks.

HAY'S WHARF AND CHAMBERS WHARF

At the thirty-fourth annual general meeting of Chambers Wharf and Cold Stores Limited held at the registered office of the Company, 3, Lombard Street, London, E.C., last month. Sir Dallas G. M. Bernard, Bt., vice-chairman, presided.

The vice-chairman, said, in part: "Despite the energetic efforts of all concerned during a very difficult period, the trading results for the 53 weeks ended March 31, 1961, were disappointing. The continuance of troubles in the Port of London interrupted the company's riverside business. The unofficial tally clerks' strike affected us severely and unofficial local dock labour stoppages, coupled with a shortage of registered dock workers during the summer months of last year, disrupted the service we normally give to our customers. These factors all increased the cost of our operations. Moreover, dock labour wages were increased on August 29, 1960, and increases in clerical and supervisory salaries followed, but the consequential increase in our charges was not obtained until November 21. The result of all this was that, although our gross revenue was greater than the previous year, this was offset by additional costs.

"I am sure that it must be a great disappointment to you

all not to see our late chairman and managing director, Mr. Charles Goldrei, presiding at this meeting as he has done since the incorporation of the company nearly 30 years ago. We have suffered a grave loss through his death.

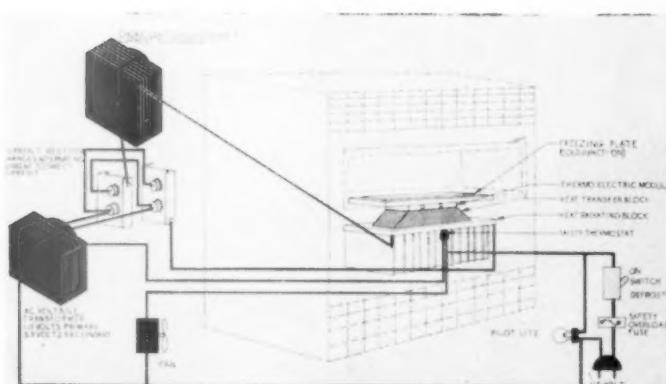
"This company really sprang from a small cold chamber which Mr. Goldrei built in the late twenties in Albany Road to provide cold space for his own imports of frozen goods. He subsequently enlarged it so as to be able to take in frozen goods from other importers and turned it into a limited company known as South London Cold Storage Ltd. He saw that there was a great future for cold stores and decided to enter the business in a larger way. So in 1934 Chambers Wharf was acquired and the company's name changed to Chambers Wharf & Cold Stores Ltd. He developed the new premises into their present successful and efficient organization. Some time ago he felt that we could not stand alone and thought was given to some sort of working arrangement with our friends, Hay's Wharf. It became clear, however, that a fusion of the two companies was the only practical arrangement and negotiations were entered into to see if a basis could be found to effect a merger. Messrs. Baring Bros. acted for us and Messrs. Morgan Grenfell & Co. for Hay's Wharf.

"After very careful consideration they suggested that rather than establishing a new holding company, it would be administratively more convenient for Hay's Wharf to offer to acquire the whole of the issued capital of Chambers Wharf. The full terms were announced to the press on July 18. Your board felt that the proposal was very fair to both companies, and if Mr. Goldrei were alive today I feel sure he would be happy with the terms proposed. I am satisfied, and so are all the members of your board, that a merger on the terms proposed is in the best interests of our shareholders."

A new range of heat barrier air curtain units are announced by Thermoscreens Limited, 420/422 Ware Road, Hertford. Two powerful fans are fitted to ensure adequate protection under adverse conditions. A unique feature of heat barriers is the provision of separate controls on each fan with variable airflow along the length of discharge slot. Aluminium construction is now employed to eliminate corrosion problems. Improved design facilitates erection in only 18 in. headroom. Standard units in widths 4 ft., 5 ft. 6 in. and 7 ft. are available on quick delivery. Heat barriers are now manufactured on a production basis at prices within the reach of all cold store operators.

NEW DESIGNERS FOR INDUSTRY

A new research fellowship worth £750 a year, and believed to be the first of its kind, is to be awarded at the Royal College of Art by The English Electric Company Ltd. next year. The offer is being made to enable young designers to work more closely with the electrical industry, in the complex techniques of translating creative ideas into practical use on the production line. The award will allow the successful candidate to carry out research in the design and use of domestic electrical appliances as a post-graduate project for one year. A sum of up to £150 will also be awarded each year to those students who, in the opinion of a Committee composed of three members of the College staff and three from English Electric, have carried out the best designs.



Thermoelectric Refrigerator / Freezer

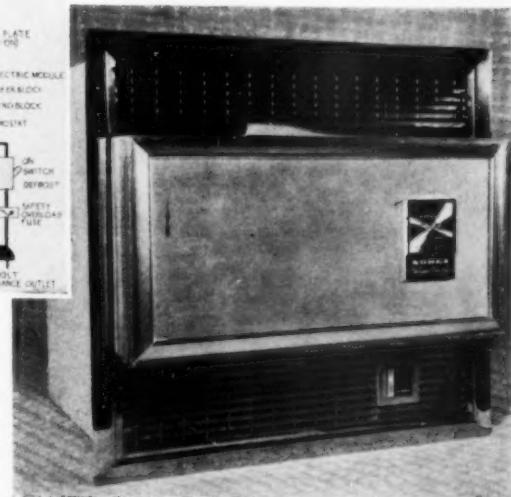
WHAT is claimed to be the world's first thermoelectric refrigerator-freezer for commercial sale has been introduced by the Norge Division of Borg-Warner Corp. An order for 500 of the units, which have no mechanical parts, was placed by the Sheraton Corp. of America, which have been installed in rooms of the new Sheraton-Chicago Hotel.

Fig. 1 is a pictograph of a thermoelectric refrigerating system consisting of a primary a.c. electric power supply and a secondary d.c. rectifier unit. Current is transmitted from an ordinary 115 volt household appliance outlet through a three ampere protective fuse to an "on" and "defrost" control switch. A pilot lamp indicates if the machine is in operation.

A 10-watt air circulating fan cools the hot junction fins, and a thermostatic safety cut-out switch protects the thermoelectric device from harm due to accidental overheating. The 115-volt current then passes through the primary side of the transformer and by induction creates a 5½ volt a.c. flow through the secondary side of the system.

Left: Pictograph of thermoelectric refrigeration system.

Below: Model that has been supplied to Chicago hotel.



The heat pumping action of the thermocouple begins when a constant flow low voltage direct current passes through them. The direct current is obtained by passing the low voltage a.c. through a series of silicon rectifiers, and the uniform voltage is controlled by means of a filter choke. The current, then passing through the thermoelectric module assembly, creates a heat pumping action—meaning that heat contained within an insulated enclosure is literally pumped or transferred from that area through the thermocouples to the hot junction plate and radiating fins where it is dissipated into the surrounding atmosphere.

NEWS OF THE MONTH

Refrigeration and A-c Exports.—During June, 1961, air-conditioning and refrigerating machinery and fans (commercial and industrial sizes) to the value of £844,282 weighing 1,087 tons was exported from the United Kingdom. Comparable figures for June, 1960, were 961 tons, worth £712,329.

* * *

Exports' Analysis.—Of the 1,087 tons of air-conditioning and refrigerating plant worth £844,282 exported by Great Britain in June—quoted in the preceding paragraph—63 tons went to the Union of South Africa, 22 tons to India, 26 tons to Australia, 46 tons to New Zealand, 34 tons to Canada, 204 tons to "other Commonwealth countries," 134 tons to Eire, 21 tons to Sweden, 46 tons to Western Germany, 49 tons to the Netherlands, 109 tons to Belgium, 35 tons to France, 8 tons to Italy and 290 tons to "other foreign countries."

* * *

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigeration machinery during June, 1961, commercial refrigerating machinery accounted for 258 tons worth £99,394, industrial plant and equipment for 281 tons worth £229,806, and refrigerating machinery, equipment and parts for 364 tons worth £278,912.

* * *

Exports of Small Refrigerators.—During June, 1961, 1,086 tons of complete refrigerators and domestic refrigeration equipment were sent overseas from Great Britain. These exports were worth £660,935. The 1,086 tons comprised 31 tons to the Union of South Africa, 8 tons to Rhodesia and Nyasaland, 54 tons to New Zealand, 108 tons to Canada, 367 to "other Commonwealth countries and Eire," 27 tons to Sweden, 44 tons to Western Germany, 8 tons to Italy and 439 tons to "other foreign countries."

* * *

Isocyanates Production.—A multi-million pound sterling plant for the manufacture of isocyanates, a basic raw material used in the production of urethane foams, will be built by the Du Pont Company (United Kingdom) Limited on its plant site

at Maydown, near Londonderry, Northern Ireland. William H. McCoy, managing director of the Du Pont British subsidiary, announced last month. This new facility will supply "Hylene" organic isocyanates, used in making both rigid and flexible urethane foams for markets in the United Kingdom and for export to other countries in the Free Trade Area. Flexible urethane foams are used chiefly for furniture and automotive cushioning and interlining for clothing. Rigid foams are used primarily for insulation in refrigeration units, building panels, and other industrial purposes. This facility, the second manufacturing unit to be built by the Du Pont Company (United Kingdom) Limited, will be located adjacent to the company's neoprene synthetic rubber plant. It is expected to be in operation late in 1963 and will provide about 125 new jobs.

* * *

Venesta and Expanded Plastics.—Last month a major re-organization commenced at the Erith, Kent, factory of Venesta Plywood Ltd., preparatory to the installation of new machinery for the production of expanded plastics. Production will commence at the end of the year, and to begin with will be concentrated on expanded polystyrene products. The first objective, starting in January 1962, is to reach an output of 1,000 tons. The initial operation will absorb about £350,000 for machinery and working capital. A more substantial investment is likely to be required as the market in the United Kingdom is developed. Behind this development there are two factors. First there is the policy of expansion stimulated by the board of Venesta Limited, the holding company, under the chairmanship of Mr. Stanley Field. Secondly, and specifically, it is the result of a careful study by Venesta Plywood Ltd. of methods of expan-



The management of Venesta Plywood Limited are seen here discussing the use of expanded polystyrene for packaging. They are: (l. to r.) Mr. H. R. Jones, office manager; Mr. J. W. Luffingham, chief accountant; Mr. R. McDowell, manager of research and development; Mr. D. G. R. Reid, director and general manager; Mr. W. P. Cruickshank, chairman; Mr. D. M. Foulds, general works manager; Mr. L. C. Webb, building products sales manager; Mr. R. F. Hawgood, packaging sales manager. Mr. W. P. Cruickshank is also executive director of the Venesta Holding Company.

sion that would at once be profitable, and readily integrated into the existing framework of the company. The decision to enter the field of expanded plastics is a logical one. There is great scope for expansion; and the sales outlets are largely covered by the company's current marketing operations.

* * *

Scottish Supermarkets.—The supermarket development programme in Scotland is giving excellent scope for the introduction of long lines of refrigerated selling space in several centres. Self-service operation introduced this trend but owing to the limited space available relatively small units were previously the rule. Now, with the expansion into supermarket operation, the self-service, refrigerated areas are growing in size and provide excellent scope for really first class displays. Among the most attractive of recent openings is the Drumbach, Glasgow, supermarket of Cooper and Company's Stores Ltd. with a major area of Smithfridge-McCrory equipment, used for presentation of prepacked fresh meat, for delicatessen bulk lines, for frozen foods and dairy produce. Another very attractive supermarket, at Shawlands Cross, Glasgow, for Sterling Supermarket, Cameron Bros. (Glasgow) Ltd. uses the latest Prestcold plant.

Air-Conditioning Show.—The first International Heating, Ventilating and Air-Conditioning Exhibition in London will be, it is expected, the greatest ever display in Europe from this rapidly expanding industry. The many requests for invitations from both home and overseas indicate a large attendance of trade visitors, who will be able to examine in the utmost comfort the latest products of an industry which manufactures plant and equipment, now considered necessary in every part of the world, for the factory, office and home. At Olympia, London, from September 26 until October 6, covering an area of more than 100,000 sq. ft., 220 firms of international repute, many of them from overseas, will show all aspects of heating, ventilating and air-conditioning including industrial air handling and treatment equipment, dust and fume collection, mechanical draught, process heating, cooling, allied and ancillary equipment and services. During the exhibition, which is organized by Industrial Exhibitions Limited, there will be an international conference on Heating, Ventilating and Air-Conditioning.

* * *

Frozen Turkey "Push."—The first major advertising effort of the newly-formed Oven-Ready Turkey Producers Association, which represents

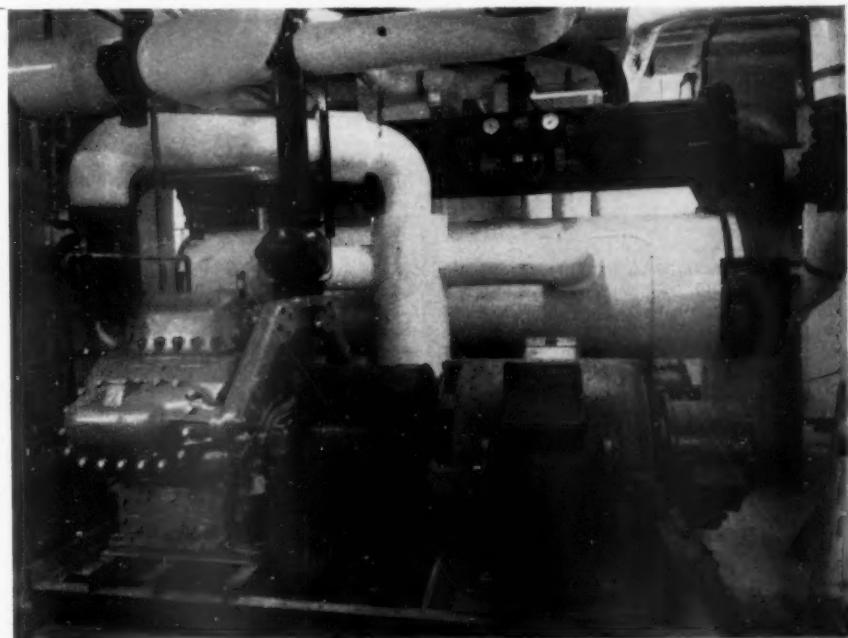
some 40 producers of these quick-frozen, individually packed birds, was an August bank holiday campaign in the national press and on television. The theme of the advertisements was "Oven-ready turkey—your best bet for the long week-end."

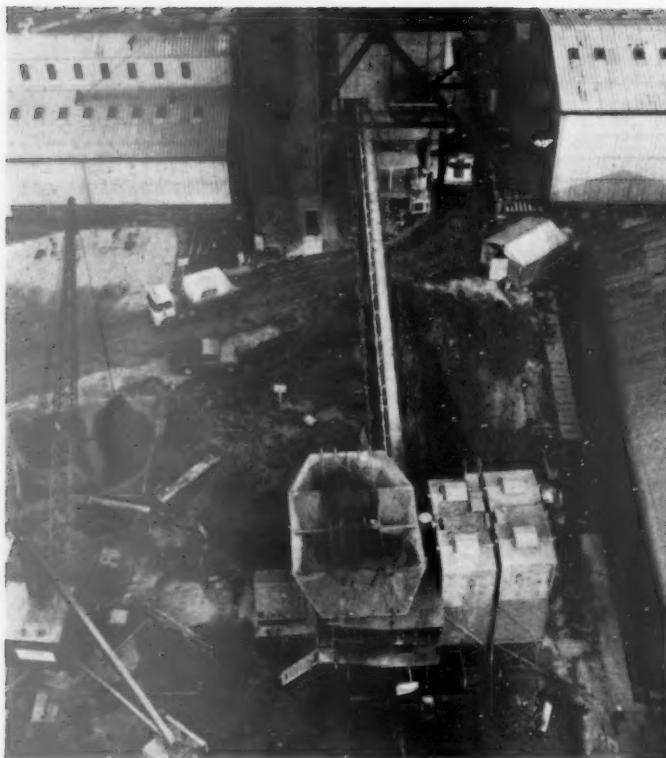
* * *

Fish Exports.—Exports by Mac Fisheries Ltd. last year reached a record total of over £250,000. This is significant at a time when the subject of food imports, particularly in relation to the Common Market countries and the Commonwealth, is being widely debated. The major market was Australasia, accounting for nearly half the total. The remainder was sold to 60 other countries. Fifty different varieties of fish, both fresh and smoked, were handled during the year. We hear that since "Macs" began exporting fish 40 years ago, they have always specialized in individual service. Last year, oysters were supplied for a banquet at the Italian Embassy in Khartoum, salmon was served at the presidential table in Liberia and a seed merchant in Kansas was sent regular supplies of potted shrimps. The key to the company's export success is good quality fish, modern processing methods, strict quality control at all stages, and first-class co-operation from air and shipping lines.

PICTURE OF THE MONTH

Typical of the package water cooling systems which York Shipley supply for air-conditioning applications is this Refrigerant-22 compressor, shell-and-tube water cooler and shell-and-tube condenser installed in one of London's office blocks recently.





Drilling Operations at Kellingley

A NEW colliery is being sunk at Kellingley in the Castleford Area of the National Coal Board's north-eastern division. When in full production it will be capable of production at the rate of 6,000 tons a day, or about 1,500,000 tons of coal a year and will provide employment for about 3,000 men. Coal will be worked in an area about four miles square around the village of Kellingley, the area being crossed by the River Aire in the north and the Wakefield/Pontefract main railway line and the Aire-Calder canal in the south. The reserves of coal to be worked amount to 200,000,000 tons, which is sufficient to give the new colliery a life of about 130 years.

Two shafts both 24 ft. in diameter are now being sunk to a depth of approximately 850 yards and for the first 50 years the output will be extracted from the Silkstone and Beeston seams which lie at depths of 2,087 and 2,298 ft. respectively. Bore-holes proved the existence of 600 ft. of water-bearing Permian measures overlaying the coal measures, the upper limestone being particularly heavily watered.

The use of brine freezing for water control, together with a non-simultaneous method of sinking and shaft lining, entailing a high rate of pouring and an extremely consistent mix, are amongst the major features of this high speed shaft sinking which is being carried out by the Thyssen Shaft Sinking Co. Ltd., of London and Llanelli. The freezing process used to seal the shafts against inflows from the strata was carried out by the Foraky Co. Ltd., 37 bores and one centre being employed to each shaft. Of these only two holes became sealed during sinking.

REFRIGERATION aids mining

High Sinking Rates in North-East

Notwithstanding the limitations imposed by the freezing process, high sinking rates were maintained during sinking through the frozen ground and when clear of this handicap, in the unfrozen ground a new record for shaft sinking was established in January when 336 ft. were sunk and 345 ft. lined in no. 2 shaft. This success particularly reflected the detailed organization of the contractors, their close co-operation with N.C.B. officials and their use of high capacity plant such as the batching plant which guaranteed the maximum availability of large volumes of concrete having an extremely close consistency.

The main sinking of no. 1 shaft started on February 26, 1960, and no. 2 shaft on June 19, 1960. Each shaft is served by two tower-mounted friction winders, and these are being used for the sinking operation. After shaft sinking has been completed the winders will be fitted with closed loop-control, an electrical device to enable winders to be operated by remote control from the banksman's level. It is proposed to wind the output at no. 2 (upcast) shaft in 15 ton capacity skips; no. 1 (downcast) shaft will be equipped with two three-deck cages and be used for winding men, materials, and dirt.

The System of Freezing

The freezing principle employed at Kellingley consisted of maintaining a continuous sheath of frozen strata around the shafts during sinking, this being effected by circulating the brine through tubed boreholes which extend well into the non-permeable strata to ensure complete sealing of the shaft. The verticality of the bores is carefully controlled such that they do not intersect the shaft line and in order that each has

approximately the same cooling area surrounding each tube. The freezing tubes, which have screwed connections, are lowered as soon as a hole is completed, the first tube being plugged at its base. As successive joints are made, they are pressure tested for tightness upon which the success of the system depends. A small diameter tube is then inserted into the completed column and, after a final pressure test, connection is made with the brine mains, the refrigerant flowing down the small bore tube and up through the column to the mains on the refrigeration plant. The refrigerant is a solution of calcium chloride in water, the freezing point of which is -22°F. at a specific gravity of 1.24. The surface brine mains are 8 in. bore and are lagged with a 2½ in. thick layer of insulating cork. In the Sterne plant, liquid ammonia is evaporated at low pressure in tubular heat exchangers, the latent heat of evaporation being derived from the brine during its passage through the heat exchanger tubes. The ammonia gas is taken from the heat exchangers to high speed, single stage, vee type, ammonia compressors, these being six cylinder machines driven by 150 h.p. A.E.I. slip ring induction motors. They deliver to banks of condensers which are cylindrical heat exchangers upon which cooling water is played, resulting in liquefaction of the ammonia before passing out through automatic expansion valves and on to the brine heat exchangers. Each ammonia circuit is independent, the four circuits being used to give the maximum reliability in maintaining brine circulation. Some 1,200 lb. of ammonia is used in each circuit. The brine circulation is some 70,000 g.p.h., maintained by two pumps, the brine containing some 70 tons of calcium chloride.

The circulation of the brine through the entire system results in long columns of frozen ground being produced round each freezing tube, the diameter of the columns increasing as freezing continues until they merge with one another and an ice wall is formed. As the ice forms, water is displaced and when the ice wall is completed, careful measurements of the quantity and temperature of the water expelled through the pilot hole gives a useful indication of the extent to which the freezing process has progressed. Whilst sinking of the shaft is in progress, the refrigeration rate is maintained in excess of the melting rate due to the higher temperature of the surrounding rocks, the ice wall gradually thickening until it extends for some distance beyond the excavation and the unfrozen core has become completely frozen, thus forming one solid cylinder of frozen rock in which the shaft is sunk. When this is achieved, any faulty bore can be isolated from the mains without affecting the progress of the work.

Drilling the Freezing Bores

Rotary drilling for the freezing bores began at the end of March, 1958, and was completed in early September, 1958, a total of some 49,450 ft. being drilled with the boring completed and the refrigeration plant installed; freezing at the site of no. 1 shaft was started on October 27, 1958, the ice wall being closed at the end of February, 1959. Commencing and closing dates for no. 2 shaft were December 15, 1958, and July 9, 1959, respectively, the resulting ice walls formed being some 80 ft. in diameter.

Sinking through frozen ground entails a number of particular considerations ; of these, the first is concerned with limiting the amount of charge and determining the most suitable pattern to obviate damage to the freezing tubes by excessive shock waves. Drill penetration rates are usually much lower and a fairly high number of holes may be rejected. In particular, difficulties are experienced with ice fissures extending for many feet which cause the steels to become frozen into the ground.

With regard to shaft-lining problems encountered here, include those due to the effect of the heat of hydration on

the ice wall and its consequent expansion. With regard to shaft lining, of the greatest importance is the need to ensure the highest degree of consistency in the mix and the minimum amount of segregation during pouring. At Kellingley, the former condition was met by the use of a Blaw-Knox AP 100 Gyramixer with delivery of the concrete via a conveyor to Blaw-Knox roller gate hoppit and then to an octopus situated between the decks of the shaft stage.

A further feature of note is the accommodation required to be made to allow for the effects of surface lift. This feature resulting from the expansion caused by the formation of ice and variation of temperatures is sufficient to throw the permanent winding towers out of alignment. To enable corrections to be made, the tower bases are mounted on grillages with facilities for jacking in order to keep the towers level.

Account had also to be taken of the need for providing effective support for the weight of the shaft lining sinking through the frozen ground due to the fact that corrugated sheets prevent the concrete from adhering to the ground.

The majority of lining in the frozen ground is of 18 in. thickness, but towards the base of this frozen area, at 460 ft., the thickness of the lining was increased in steps from 18 in. to 24 in., then to 27 in., at this point the frozen ground ended. Below this level the lining was reduced in thickness from 27 in. to 24 in., then to 18 in. and finally to the normal ground lining of 12 in.

The main equipment used for the sinking consists of a two deck stage which is suspended in the shaft by four ropes which also act as guide ropes for the riders of the hoppits. The decks are 30 ft. apart and surmounted by a catwalk 10 ft. above the top deck. The first or upper deck carries four 2 ton worm driven, self stabilising winches for movement of the shuttering in the shaft. The air and water manifolds are also carried on this deck. Between the decks is located the octopus and chutes for emplacing the concrete lining, the chute trunking being of light gauge steel sections joined by chains to give flexibility in operation. Two columns for air and water services are also fixed between decks, the top manifolds receiving hoses from pipelines temporarily attached to the shaft lining.

Underneath the bottom deck of the sinking stage is situated the mechanical loading equipment. This is compressed air driven and is suspended from an inner and outer monorail. The main hoist motor which operates the 20 c.ft. Priestman Cactus grab, is also mounted on rails inside the unit, which then allows the grab transverse as well as circumferential movement. The 20 c.ft. Priestman Cactus grab is of the compressed air, six bladed type.

The circular monorail is broken for a short section to allow the stage to be raised above the level of the services pipes fixed to the shaft wall at the point where it is broken, an inner rail on a shorter radius being fitted to maintain continuity. The drilling hoppit consists essentially of a number of radial steel sheet plates which form segments to which the drilling machines are returned after use. Each machine is numbered and a corresponding number is marked on each segment of the hoppit. Thus any defect in the drilling machine is noted on the plate forming the segment corresponding to the drill and is easily read off by the fitter on surface. The mucking hoppits, no. 1 shaft 85 c.ft. and no. 2 shaft 105 c.ft. capacity, are secured to the winding rope by three suspension chains, the chains being detachable from the hoppits to leave them clear for loading.

The winders are part of the permanent mine installation. At no. 1 shaft a friction winder is driven by a 1,100 b.h.p. A.E.I. motor while at no. 2 shaft the winders are driven by twin 1,100 b.h.p. A.E.I. motors at 11,000 volts. The winder drums were modified during sinking to accommodate single rope winding. The towers are of

steel construction and are fitted with deflection pulleys in order to bring the winding ropes into the correct position for sinking.

The prime requirement of an extremely high rate of production, coupled with an extremely consistent mix of constant water/cement ratio has been met by the provision of the Blaw Knox AP.100 concrete mixing plant which has an output of 100 c. yd. per hour and can feed to either shaft. Essentially this plant consists of four sections, the first of which is an eight compartment batching plant which has an aggregate storage capacity of 100 c. yd. a weighing unit and a control panel. Cement is stored in extendible bulk cement handling units. The main section of the plant comprise the twin Blaw Knox Gyramixers with a mixed batch output of 28 c.ft. A further section consists of two specially fabricated conveyors, constructed by Thyssen Shaft Sinking Co. Ltd., which take the concrete to either shaft and the 2 c. yd. wet receiving hopper located here to receive the concrete before discharge to the 2 c. yd. Blaw Knox roller skips used for transport down the shaft.

The batching plant comprises three main units, these being the main bin unit which includes the operating platform and control panel, the supporting structure and aggregate weigher and a flared top section. The operation of the plant, through the control panel, is by air assisted manual controls and weigh dials. Pneumatic rams control the radial gates feeding aggregate to the weigher, and air operated valve controlling the discharge of cement to an independent weigher. Water is metered out in a 35 gal. siphon type pressure tank calibrated in lb. and gal. and is discharged to the mix by a press button control. The containers operate at a pressure of 90 p.s.i., the supply being derived from the town mains supply. In addition to the hand operated valves for operating the main discharge rams, the control panel is also fitted with indicator lights which show such points as the position of the mixer door, the length of the mixing period and whether electric power is on for control operations.

The two "Gyramixer" stationary pan type units incorporated in this plant each have an unmixed capacity of 42 c.ft. and a mixed batch output of 28 c.ft. The overhead drive to each is a single, enclosed unit and the pan, fabricated from wear-resistant alloy steel, forms an integral part of the base structure, which allows shallow mixing and eliminates the need for a central pedestal. Discharge is through a 13½ sq. ft. rectangular sliding door, the movement of which is ram controlled. The mixing unit consists of a rotary gear box which revolves round the centre of the pan. It carries two stars, each rotary about its own axis and is fitted with three mixing blades. Floor and wall scraping blades are also attached to the rotating gear box. The stars rotate at unequal ratio and the blade path is such that the entire pan area is covered once in each revolution. With these mixers, batch time throughout the contract was 30 seconds.

Ground Strength Specification

The specifications require a minimum strength of 4,500 lb per sq. in. at 28 days in frozen ground, the average figures obtained to date being 7,000 lb. per sq. in. In unfrozen ground the specification is for 3,000 lb. per sq. in. the average figure reached here being 6,000 lb. per sq. in. at 28 days. During the lining in frozen ground, Sulfacrete was employed, Earles Portland cement being used in unfrozen ground.

The aggregates are closely checked for organic content, moisture size, etc., and the aggregate pits are heated with steam pipes to maintain an even temperature and hence control the moisture content. The container on the batching plant is also heated, thus guaranteeing uniformity of mix and moisture content. The mix used in the frozen

section was :—0.296 tons cement, 0.429 tons sand, 0.729 tons gravel, 12 gal. water. In the unfrozen ground the mix was :—0.239 tons cement, 0.594 tons sand, 0.880 tons gravel, 18 gal. water.

The sinking routine in frozen ground was dominated by the necessity of ensuring that the freezing tubes were not damaged by excessive shock waves. Thus in this section, a three square draw cut, comprising 12 holes, followed by a round of 64 holes was adopted and in order to rationalize the drilling as far as possible, the floor of the shaft was divided up into quadrants and the cut, two machinemen being permanently allocated a section. Thus in the cut, the two most experienced drillers were located, each drilling the full depth of 6 ft. and working on diametrically opposed holes. In the quadrants, the first of the two drillers worked to a depth of 4 ft. 6 in., continuously, the second machineman being permanently engaged in deepening these holes to 6 ft.

Ice Fissures

Ice fissures of up to 30ft. in depth and 6 in. wide caused considerable difficulty when drilling throughout the frozen ground. The frictional heat generated by the rotating bit caused a rapid thaw of the ice, which in liquid form was blown up the hole, refreezing in the process. Thus large numbers of holes were rendered useless, by the drill steels becoming completely frozen in their holes.

Modification of the drilling machines to allow for high volume blowing of C/A at the tip, in order to cool the bit and remove from the hole any liquid formed before refreezing took place, met with some success.

Integral drill steels with cross bits were used throughout the frozen ground, but did not prove ideal for normal ground. Here integral steels with chisel bits produced far better results.

Charging of the boreholes is carried out by N.C.B. deputies assisted by Thyssen personnel. The amount of explosive to be used in any one round in the frozen area was limited to 150 lb. to ensure that excessive shock waves were not set up, which could possibly cause damage to the freezing tubes. The depth of the rounds varied between 6 ft. and 10 ft. according to the strata encountered.

This limitation of explosives made it necessary to fire twice for each full round of holes bored, the outer or cropper holes being fired separately from the rest of the round. Parallel mains electrical firing was employed.

To reduce charging time to a minimum, the buss bars are prepared on surface in a priming shed. The buss bars are laid out in accordance with plans displayed on a wall panel which show the exact positions for attaching the detonator leads. These leads terminate in "inert" primers which consist of plaster of paris containing an outer groove for the detonator leads, the detonator being inserted firmly through the centre of the plaster of paris so that it protrudes approximately ¼ in. into the following stick of explosive. Non-inflammable, sand filled, paper bags are used for stemming.

Smoke clearance is effected by a booster fan in the main 30 in. air services column which is carried down as shaft lining proceeds. The stage is raised 150 ft. before firing and the shaft is inspected before it is lowered after firing. With the stage in position, mucking commences, using four hoppits. Thus, whilst the grab fills a hoppit on the east side of the shaft, the west winding rope drops an empty hoppit on the west side of the shaft and picks up a full one. When the hoppit on the east side is full the grab swings around and commences loading on the west side.

Loading is always arranged to take place underneath the winding rope carrying the full hoppit to the surface.

The temporary support employed in frozen ground consists of steel channel rings, suspended on hooks, with

dowels inserted in the ground every 5th ring to provide additional security. Behind the steel rings are placed corrugated steel sheets held against the ground by timber poling boards and wedges.

Routine of Operations

Sinking and lining routine in coal measure strata was to sink 40 ft. and to line this section immediately. During sinking, the ground was secured by wire mesh and anchor bolts which were placed at a minimum depth of 4 ft. into the rock. This system could not be worked in the frozen ground due to the presence of the corrugated back sheets which prevented the concrete adhering to the ground. The following procedure was therefore adopted :—

(1) 40 ft. of shaft was sunk and back sheets placed only in the top 30 ft.

(2) A concrete crib was placed in this bottom 10 ft. section which was in immediate contact with the ground.

(3) Sufficient waiting time was allowed to elapse before sinking further to allow this crib to gain strength. Only in the 1st crib placed in either shaft was this waiting time required.

(4) A further 40 ft. of shaft was again sunk, and again only the top 30 ft. back sheeted.

(5) Another crib was placed in this bottom 10 ft.

(6) As soon as this crib was placed, lining of the first 30 ft (item 1) took place.

This procedure was followed throughout the frozen ground, and allowed each crib sufficient time to gain strength to support the 30 ft. section above it.

The lining was emplaced in 5 ft. lifts, the shuttering consisting of two 2 ft. 6 in. high rings of $\frac{1}{4}$ in. steel plate used with releasing segments. In frozen ground, provision was made in every 5 ft. lift for eight injection pipes, with a further eight being located in the crib ring. The grouting was carried out within 10 days of placing any part of the lining, whilst local thawing of the ice was occurring. For each 40 ft. section, some 20 to 30 tons of cement were injected, using a Boulder grouter.

The grouting was carried out at a maximum pressure of 60 p.s.i. The mix was prepared on surface in a tub fabricated from a section of ventilating tube, in which rotating paddles are located, these being powered by a Consolidated Pneumatic type 327 drill. From the mixers, the grout passed by a 2 in. plain flanged gravity line down the shaft, this terminating in a rubber hose which connected with the boulder grouter, situated on the sinking stage. A 1 in. air line was taken from the stage manifold to the grouter, which has a pressure reducing system.

The boulder grouter, which incorporates its own agitating chamber uses some 80 c.f.m., and has a chamber capacity of 4 c.ft. The high degree of agitation provided by the grouter was particularly important during the operations, in ensuring the injection of a high quality grout.

The concrete is brought down the shaft in Blaw Knox 2 c. yd. concrete skips, these discharge to a folding chute, from the base of which is led four trunk ranges, thus splitting the concrete equally into four parts. Each section of the light steel trunking is cone-shaped and has hooks at its base to allow other sections to be attached by chains, this arrangement also giving the maximum flexibility and ensures that concrete is placed without segregation taking place. Of particular importance is the achievement of a thorough vibration to eliminate voids and ensure uniform compaction. This is carried out with Consolidated Pneumatic 325 poker vibrators. During the placing of the lining provision is made for pipe clamp supports, safety rope support, and also Bunton boxes for cross girders for guide rails.

Holes to accommodate steel pins for the stage safety ropes are placed every 40 ft. and also attached to these

pins are pulleys to facilitate movement of shuttering in the shaft. The ropes from the four winches on the top deck are passed around these pulleys and then attached to the shuttering at four points. Four safety ropes are attached to the stage during mucking operations, to prevent overload on the guide ropes.

Temporary supports are used in the coal measure strata B.R.C.13 gauge wire mesh, 3 in. \times 3 in. squares in sheets of 6 ft. \times 14 ft. and 4 ft. roof bolts with Rawls-shields and 9 in. \times 7 in. \times $\frac{1}{2}$ in. steel plates.

Where ground conditions were normal, roof bolts were placed in rows, 5 ft. between each row to allow 1 ft. overlap on the wire mesh sheets. If the ground conditions deteriorated, double sheets of wire mesh were placed and extra roof bolts were inserted where necessary.

Occasionally it was found possible to recover a small percentage of the roof bolts during concreting operations, but this depended entirely on ground conditions.

Muck Tipping

A lazy chain method of muck tipping is employed at surface, the tipping level being fitted with interlocked, pneumatically controlled doors such that the muck chute loading the storage bins from the hoppit cannot be lowered without the bottom shaft doors being first closed. The lazy chain which lifts the bottom of the hoppit is also arranged such that it cannot be applied unless the muck chute has first been lowered.

Twenty shifts are worked each week, the N.C.B. taking over the shafts on Sunday dayshift each week for maintenance and testing of their equipment.

Each shift is of eight hours' duration with a 30 minute break for food.

Underground each shift consists of :—

- 1 Foreman
- 1 Chargehand
- 1 Grab driver
- 2 Onsetters
- 8 Sinkers

Output from no. 2 shaft during the record breaking month was some 15,000 tons of rock excavated and 2,880 tons of concrete emplaced.

High Sinking Rates

The establishment of new high sinking rates at this site by the contractors reflects to a considerable degree the detailed attention given all aspects of the sinking routine. This is particularly reflected in the attention given to such points as the provision of drill hoppits and the use made of small portable air motors to provide power for such operations as grout mixing, tape winding, etc. These motors are, in effect, Consolidated Pneumatic type 327 reversible drills which are welded to suitable frames and which, in the case of tape winding, provide an extremely convenient method of raising and lowering the shaft measuring tape without damage.

The shafts are being sunk by the Thyssen Shaft Sinking Co. Ltd., of London and Llanelli, for the No. 8 (Castleford) area of the N.C.B. The freezing and sinking contracts are being supervised by Mr. J. J. Gill, divisional new sinkings controller, the agent for the contractors being Mr. E. Bornemann. The master sinker of No. 2 shaft, in which the new record for sinkings of this category was established, is Mr. R. Elkan.

Modern Refrigeration is obtainable from the manager, MacLaren House, 131, Great Suffolk Street, London, S.E.1, at thirty-five shillings per annum post free to any part of the world.

FUNDAMENTALS versus RATINGS

Relative economics of water and power

HERE appears to be a tendency in some quarters among non-technical people to consider that the rating conditions on which refrigeration equipment is selected should be adhered to, irrespective of economics or site conditions which may not have been known to the contractor or refrigeration supplier at the time of tendering or ordering.

Water Flow Rate

For example, vendors have from time to time tried to insist on a high water rate of flow through a condenser in a temperate climate, because that rate is called for by the section of tabular data normally used in the vendor's territory; an adjoining section shows that the same equipment, without change in evaporation temperature, compressor size or motor horsepower rating, would operate under tropical conditions in return for a minor reduction in refrigeration or minor increase in condenser pressure. What obstacle exists therefore to producing a tropical condenser pressure in a temperate climate except in the minds of the individuals?

Such unilateral thought can cloud the issue by diverting attention from other possible causes of faulty operation which will be dealt with later.

Consider, for example, a case where the vendor considers 60°F. water as typical of a district; he may have been brought up to think of 20° temperature rise; 400 gal. of water per hour with that temperature rise are in his estimation required for 66,000 Btu. per hour cooling duty when taking into account the heat equivalent of the compressor motor power. If a water recooling tower is to be provided, this quantity of water is of little importance as only the equivalent of that evaporated and lost by air movement has to be drawn from the mains. Occasionally, however, it is not permissible to economize in water by recoiling it; the refrigeration user may be only one of a number of tenants in a building and access to a roof or other suitable site for a water recooler may be either impossible or unavailable. Interference, either psychological or electronic, may be another reason.

The position may be further complicated by non-availability of water mains pressure for the normal design quantity; with a cooling tower the resistance of a condenser to water flow is readily catered for by pump selection. In these days of packaged units and catalogue standards a condensing unit may have only one size of condenser per compressor, also only one size of motor and of compressor; the air-conditioning engineer may be unconscious of the possibility that the unit offered him may have been basically designed

for ice cream or refrigerator temperature, and that the snowball effect of modern so-called improvements may be to his disadvantage.

Many Demands for Water

To think in fundamentals can be a refreshing exercise even in a heat wave. Why should 400 gal. per hour be demanded for quite a small plant at a time when neighbouring gardeners are forbidden to use a drop and when the mains pressure is too low to ensure its flow even if the supply is rendered available by sacrificing others? What would have been the position if the unit had been originally designed for air-conditioning instead of sizing the condenser for ice cream duty? The pressure ratio between condenser and evaporator pressures which affects compressor efficiency and power absorbed becomes smaller as the temperature of the evaporator duty and the evaporator pressure rise if the condenser pressure is pegged to outdoor temperature. The pressure ratio with air-conditioning may be so small that in spite of denser refrigerant vapour the power curve is beyond its peak. Reference to the tables for application of the same compressor to tropical conditions may show that the same compressor in these days of standardization is driven by the same motor in the tropics as in temperate zones.

Effect of Water Economy

Consider, therefore, the effect of employing a smaller water gallonage than that dictated by a standard water temperature rise. Instead of 80°F. water at outlet with 60°F. supply and 90°F. condensation, check the effect of 100°F. outlet temperature, thus using only half the water.

The condenser duty with 400 gal. of water per hour (10 lb. per gal.) and 20°F. rise is 80,000 gal. per hour. With 200 g.p.h. the condenser pressure would be higher and the power approximately 10 per cent. more, but the heat input of the extra power would be offset by the slight reduction in refrigerating effect. For the purpose of this exercise the total Btu. to condenser water may again be taken as 80,000 Btu. per hour.

With the aid of the basic formula for heat transfer in unit time $H = kA\theta$, it may be seen that with an existing condenser the area A is constant, the variables are therefore k, the coefficient which depends mainly on whether the water flow is turbulent or laminar, and θ the temperature difference. The extreme cases where high resistances to water flow are incurred usually occur with abnormally high water speeds, therefore if water flow is reduced to half it is most likely still turbulent with correspondingly main-

tained values of k . In a healthy refrigerating plant the only variable of importance is θ , the mean temperature difference. Although logarithmic m.t.d. is more accurate, it will suffice for rough comparison to use arithmetic m.t.d., i.e., in the standard case 100°F . condenser minus $(80+60)/2 = 100 - 70 = 30^{\circ}\text{F}$. m.t.d. As condensing temperature equals mean water temperature plus m.t.d., and the mean temperature of water in at 60, out at 100, is 80°F ., a condenser gauge temperature of 110°F . will give the same m.t.d. of 30° , and is well within the capabilities of a refrigerating plant in the tropics.

Conscientious Trouble Shooting

Consider now teething troubles that might be masked by too ready a tendency to blame the anomaly that is noticed first.

Stoppage by high pressure cut-out may be hurriedly blamed on to shortage of water, an apparently obvious reason to those who think qualitatively rather than quantitatively. Masking of condenser surface by liquid either from excessive charge, or refrigerant which should be on the other side of the regulator, and other possible ailments should nevertheless be investigated; incorrect valve settings, blockages, dryer troubles and controls are equally worthy of suspicion.

Deviation of water quantity from the catalogue writer's ideal is, therefore, only a further incentive to thought which may harass the sales or serviceman in time of stress. On the other side of the fence the user may find his operating costs enhanced by £100 per year of 4,000 hours (i.e. 200 g.p.h. at 2s. 6d. per 1,000) when £10 worth of electricity would produce the same over-all result.

Rising Costs Affect Research Associations: Pressing Problem for D.S.I.R.'S Industrial Grants Committee

THE rising cost of research is critically affecting the research associations serving small industries, says the Industrial Grants Committee of the Council for Scientific and Industrial Research in their report for 1960, on sale last month*.

It is a problem affecting all research associations but the smaller grant-aided organizations are experiencing particular difficulty in raising adequate grant-earning industrial income. In dealing with it, the Industrial Grants Committee points out that a research association's income should be adequate to meet the technical needs of the industry concerned and to offer an attractive prospect to new young research workers. Yet the size of an industry is not the sole criterion of its economic or technical importance.

But, warns the committee, the Department of Scientific and Industrial Research must be satisfied that co-operative research schemes are "technically and economically sound before offers of grant are made."

Practical co-operation between research organizations—such as the housing of the small File and Cutlery Research Councils in the laboratories of the much larger British Iron and Steel Research Association—can assist greatly. The committee has considered other possible ways of meeting the research needs of small industries: by placing contracts with established research organizations or even through central facilities for industries whose problems would not of themselves justify a permanent independent laboratory.

The committee point to the small cutlery industry as one which has faced up to this problem of rising costs and placed the Cutlery Research Council on a sounder financial basis. A new arrangement assures a reasonable industrial income by statutory levy.

The committee is acutely conscious of the need to ensure that research results are conveyed to and applied by industry with the minimum delay. The indications are that the special grants which have been offered to R.A.s to set up this activity are being effective.

Other points in the committee's report include:

A decision that, subject to certain safeguards, foreign firms may, if the industries so desire, be admitted to membership of one of the British industrial Research Associations. The D.S.I.R. would not, however, pay any grant in respect of any income from foreign countries.

* "Research for Industry 1960." Published for D.S.I.R. By H.M.S.O. Price 8s. By Post 8s. 7d. (U.S.A. \$1.44).

Negotiations are to be opened with Commonwealth governments to discuss the possibility of their paying grants to a Research Association in respect of any member firms from the Commonwealth.

Two new research associations were admitted to the government scheme during 1960. They were the British Industrial Biological Research Association and the British Brush Manufacturers' Research Association.

Close co-ordination of effort is being achieved by several groups of Research Associations, notably in the textile and food industries. A merger between the cotton and rayon r.a.s has resulted in the new Cotton, Silk and Man-made Fibres Research Association. And another significant change during the year was the reorganization of the former Research Association of British Rubber Manufacturers to cover the rapidly expanding field of plastics under the new title of the Rubber and Plastics Research Association of Great Britain.

The committee is considering how arrangements for research into problems of industrial health and safety in the research associations can be improved. The report contains an article by Dr. A. H. Sully, director of the British Steel Castings Research Association, on current work in these fields—see a recent D.S.I.R. News Release "Food, Health and Safety."

The report also contains a review of the principal achievements of the 10 research associations whose grants were renewed in 1960.

They include:

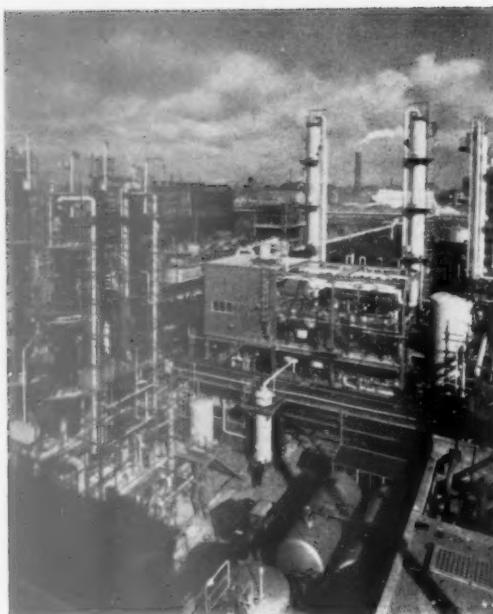
The Cutlery Research Council's metallurgical work has led to the use of higher carbon stainless steel for butchers knives. This steel keeps an edge far longer than traditional non-stainless steel and saves at least 75 per cent of a butcher's time in whetting knives.

Glass articles possess less than one per cent of their theoretical strength. The British Glass Industry Research Association, whose work has shown that great increases in strength—approaching the theoretical value—can be obtained under laboratory conditions, are now trying to apply these findings commercially.

The British Jute Trade Research Association has developed a new and permanent fire proofing process for jute cloth. It gives a high degree of protection against fire and, equally important, against after-glow. It is also unaffected by prolonged immersion in water.

A strikingly simple method of severe cold rolling of highly stressed motor car parts, such as fillets of stub axles and crankshafts, has been found by the Motor Industry Research Association to improve fatigue strength by more than 100 per cent. The rolling process also enables a much lower strength and less expensive alloy to be used.

Accurate information on the journey hazards of a parcel or package may lead to new packaging designs, incorporating special cushioning materials.



Acrylonitrile plant at Cassel Works, Billingham.

SYNTHETIC rubber, now so widely used, is a post-war development of pre-war research discoveries.

Early in the century F. E. Matthews of the now famous firm of Strange and Graham spent many years on the task and eventually, by the use of sodium as a polymerizer, produced a minute piece of dark looking sponge, the first poor but promising imitation of natural latex.

It was a laboratory success only, but the German Government seized on it during the first world war in their struggle to break the stranglehold of the British blockade that was paralyzing their transport. The German chemists set to work to develop the process, and used the rubber on their military vehicles. They produced the rubber in significant quantities, but it had no effect on the course of the war. It was a chemical miracle, but it used up more resources than Germany could afford. When it was used for tyres, the vehicle had to be jacked up during long stops because the rubber was liable to spread.

In this country no progress was made for many years. Synthetic Products Ltd., a company formed by Matthews and his colleagues, was wound up in 1926. The supply of natural rubber at glut prices must have helped make their project unprofitable.

Not until 1930 is there any trace of British development. In that year I.C.I. showed their interest in the subject by filing a patent covering the polymerization of elastomer forming monomers under high pressure. In 1934 a piece of rubber was publicly displayed. It was remarkably oil resistant but very expensive.

In 1936, I.C.I. started research in earnest, and in 1940 made the important discovery that the poly-

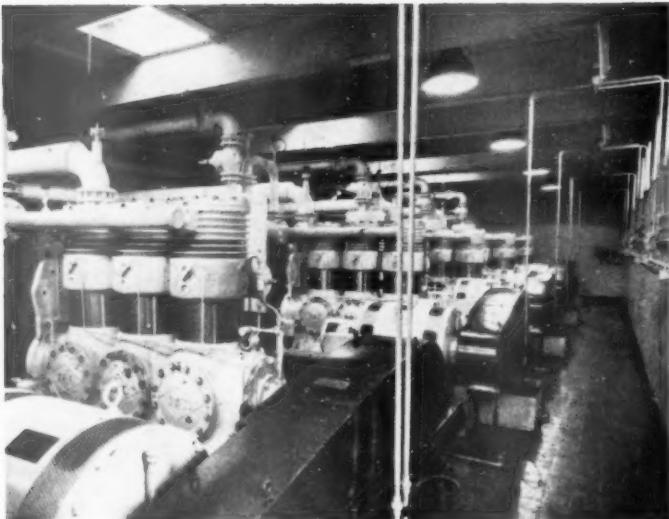
REFRIGERATION and Synthetic Rubber Production

merization process could be greatly accelerated at much lower temperatures. This was applied to the manufacture of PVC plastic, which was urgently required for war purposes.

Synthetic rubber manufacture was, by government decision, left entirely to Canada and the U.S.A. and this gave the U.S.A. a considerable lead. Only recently have we been able to catch up, as shown by I.C.I.'s production of the Butakon A range of butadiene acrylonitrile copolymers. These can be used to manufacture synthetic rubber with varying characteristics to order, and to reinforce natural rubber with similar results. Artificial shoe leather which looks and works like leather but wears three times as long, acrylic fibres for fabrics, and the latest vynile floor coverings impervious to damp, impossible to rot, and difficult to wear out are more popular examples of how manufacturers of consumer goods are handing on to the public fruits of I.C.I.'s intense research in his line.

The photographs show the latest acrylonitrile plant at the Cassel Works of the General Chemicals Division, Billingham. In this new plant acrylonitrile, a clear colourless mobile inflammable liquid, is made at Billingham, and piped under the River Tees to the factories at Wilton to feed the large Butakon producing installations there. Acrylonitrile has also been added to the list of intermediate chemical products that, like Butakon, are widely demanded by manufacturers all over the world.

The process involves cooling at a number of points and refrigeration equipment has been provided by U.D. Engineering Co. Ltd., using "Arcton" 12, noted for its non-flammable and non-toxic properties.



The compressor set comprising five 9/3 UDEC compressors using Arcton.

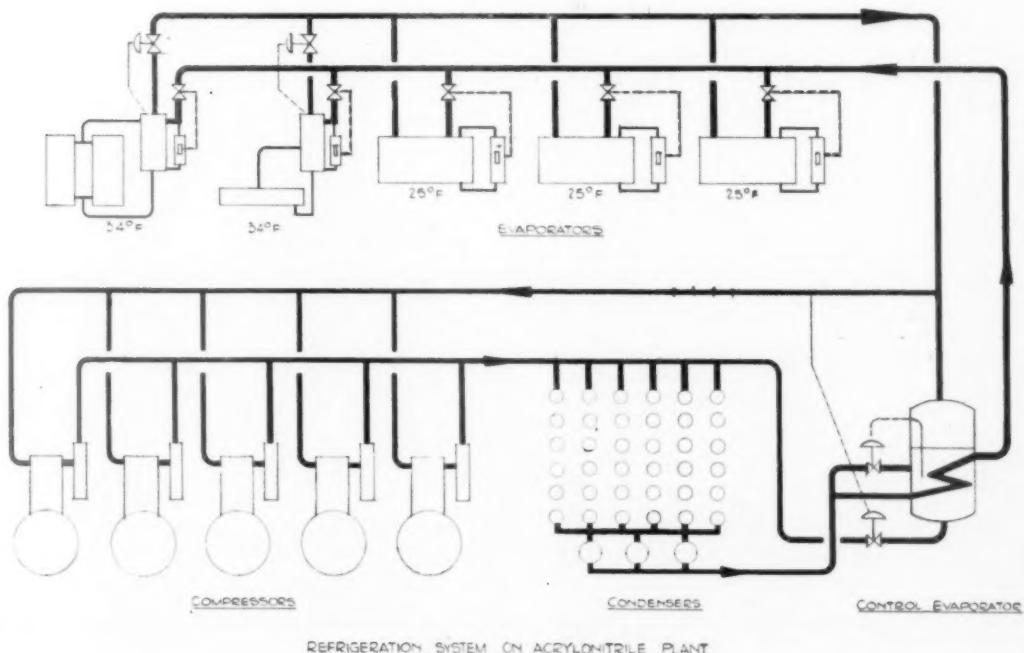
UDEC Equipment

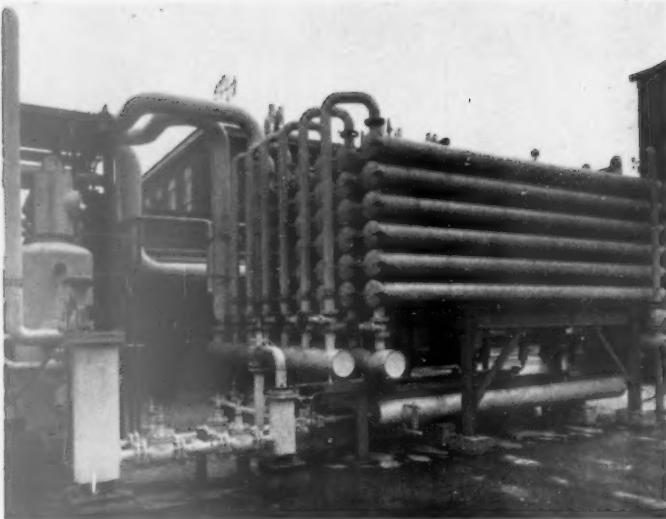
The simplified line diagram shows the UDEC equipment. Five standard UDEC No. FB 9/3 "Arcton" 12 compressors are used, each having three cylinders, 12 in. bore x 8 in. stroke, running at 450 r.p.m. They are chain driven from five 200 h.p. 1,400 r.p.m. motors.

The temperature of the lower evaporator, normally at 25°F., is controlled automatically by means of a "control evaporator" which was designed to

I.C.I.'s special requirements. This has a capacity equal to that of one compressor. Some of the hot gas from the compressor delivery is by-passed to this control evaporator and used to evaporate liquid from the condensers, the amount of gas used in this way being controlled automatically from an impulse point in the compressor suction line.

In order to waste as little power as possible when using the control evaporator to take up load, the liquid going to the main evaporators passes through





a coil immersed in the boiling liquid in the control evaporator. The liquid flow into the body of the evaporator is maintained by a level controller.

The condensation and cooling required on the acrylonitrile plant is obtained in flooded shell and tube evaporators with low pressure float controls. The two evaporators which work at the higher temperature (34° F.) are maintained at a suitable higher pressure than the others by automatic pressure control valves.

The UDEC condensers.

OBITUARY

Mr. C. B. Copeman

IT is with deep regret that MODERN REFRIGERATION has to record the death of Mr. C. B. Copeman who for 10 years was chairman of Refrigeration Press Ltd.'s parent company, Maclarens & Sons Ltd., with which firm he had been associated for almost 55 years.

Mr. C. B. Copeman died peacefully in his sleep at his home, Headlands, Southcliffe, Bexhill-on-Sea, early on Friday, July 21. He was 74 years of age.

Mr. Copeman was the elder son of the late Mr. Frank Copeman, a former chairman and managing director of Maclarens & Sons Ltd., who, in the early days of the business was in partnership with the founder, Mr. W. F. de Bois Maclarens who became the first chairman, when the business, which originated in Scotland, was converted into a limited company. Following the death of Mr. Maclarens, Mr. Frank Copeman succeeded to the chairmanship and at his death the late Mr. J. H. Macadam (father of Mrs. Harold Copeman), whose long service with the company was mainly directed to the editorial side, became chairman and managing director. Mr. C. B. Copeman was appointed a director of the company in March, 1919, vice-chairman in May, 1927, and chairman in February, 1951.

Mr. Copeman, during his long association with the firm of Maclarens', had become well known to very many readers of its several publications for he took a keen interest in the affairs of the trades with which the publications of Maclarens' were concerned.

Although in business he was closely associated with the advertising department and the firm's representatives, Mr. C. B. Copeman always had an eye for a story and was a great help to all editorial departments. In the administration of the firm he was greatly esteemed by all members of the staff for his kindly manner and sympathetic approach to anybody in trouble and his willingness to help all members of the staff no matter how humble a position a person may have held. Yet, withal, he was a strong administrator, a man with vision and foresight.

The late Mr. Copeman was educated at Dollar Academy and afterwards on the Continent. He spent much of his time travelling in Britain and on the Continent and also visited the

United States and Australia in the firm's interests. His especial interest in the publications of Maclarens and Sons was in the rubber side and it was with the Institution of the Rubber Industry with which he had been actively concerned since the earliest days of the movement. He was a member of its council (and had served in that capacity at intervals for many years) and of various committees.

Mr. Copeman, in addition to his business activities, was much concerned with many social and educational functions, particularly in Essex where he lived for very many years. During the last war he was superintendent of the Essex Special Con-



stabulary, which position he held for nearly 21 years. He was also chairman of the governors of the County High School, Brentwood, and even after he moved to Bexhill he retained his interest in the school. A gentleman of unaffected tastes, Mr. C. B. Copeman devoted a great deal of his time to his children and grandchildren. In addition, he was a very keen philatelist with a special interest in Belgian issues.

Mrs. C. B. Copeman died on May 29, 1960. Mr. Copeman leaves two sons, Frank and Derek, and a daughter, Jennifer, now Mrs. Hewitson.

A.F.D.

BRIGHT STAR OR METEORITE?

IN the eyes of The Sugar Refining Company Limited the advent of accelerated freeze-drying represents "one of the great turning points in food processing." This was the view of the chairman of that company, Mr. J. E. MacEllin, when he inaugurated recently the first commercial a.f.d. factory—at Mallow in County Cork.

"I would like to say," went on the chairman, "and it gives me great pleasure to do so, that the credit for making the technique of accelerated freeze-drying practicable must go to the British Ministry of Agriculture, Fisheries and Food and its fine team of workers at Aberdeen. And at this point too I want to compliment Vickers-Armstrongs for their initiative in undertaking the manufacture of commercial plant to exploit the Ministry's process and I am glad to say that the quality of the food coming from the Mallow process is all that we expected. Their engineers have done a very fine job indeed."

"It is not for me to laud the merits of our staff concerned with this work—it would be embarrassing for me and for them were I to do so. But let this alone be a measure of the tribute which I and my colleagues on the board would like to pay to them—'No words can be uttered to form a tribute adequate enough for the debt which the nation owes them.'

"We are fully aware that we will not for long be alone in processing food by this new technique. We know that other a.f.d. plants will go up all over the world but the lead we have gained is a big advantage."

"The soil and climate of Ireland combine to give us natural conditions wonderfully suited to the growing of vegetables and fruits of fine quality and fine flavour and the production of high quality poultry, beef, mutton and

pork. Our farmers are fully aware of the potential which these possibilities offer and while the area of fruit and vegetables here at present is not very great it is expanding rapidly. Those farmers who have already undertaken small crop culture for the first time have demonstrated that lack of experience is no disadvantage. It would be no exaggeration to say that the whole of Ireland is at the moment keyed with the expectancy of great things from this recent ferment in farm activity. Ireland is traditionally a producer of high quality beef, lamb, butter, poultry and eggs, and Mallow on the Blackwater river is in the heart of a rich productive mixed farming region. Fresh food of all description can be produced in abundance within a 30 mile radius of the town. Sea foods (fish, prawns, lobsters, etc.) can be harvested along the seashores of County Cork—along the same shores in fact which at present supply beet to the sugar factory. In fact, one can fish for salmon, trout and dace from the factory grounds.

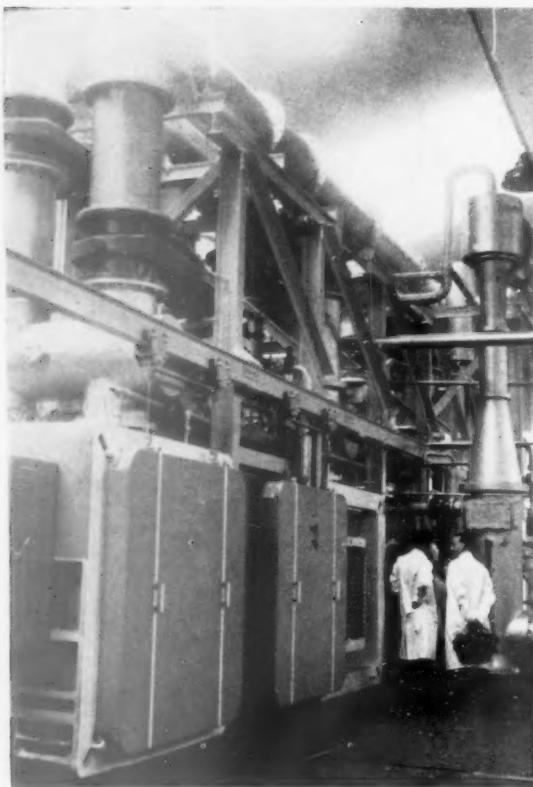
"With accelerated freeze-dried products, distance is defeated and the saving made by lower transport costs and non-refrigerated transportation will place us in a very competitive position on overseas markets. We will be able to provide high quality foods in good wholesome fresh condition in and out of season. All the goodness of the foods will be fully preserved; they will have retained all their natural flavour, appearance and nutrient value when reconstituted."

A short description of the Mallow plant was given in August, 1960. As a short "recap" here on the process involved, suffice it to say that in any method of freeze-drying, the material to be dried is first frozen, either by direct evaporative cooling of the food itself under a high vacuum or some other form of refrigeration; it is then



The new food processing building of the Irish Sugar Company at Mallow.

held in a very high vacuum so that the ice in the tissues is evaporated as rapidly as possible. The freezing process is thus only a preparatory step, subsidiary to the drying process. Drying by the a.f.d. process is complete in



from six to 10 hours according to commodity, which compares with 24 to 48 hours by older methods of freeze-drying; the product retains the shape and structure of the

undried material, but is much lighter in weight. This follows from the fact that most foodstuffs contain between seven and nine tenths of their weight of water ; it is this water which is removed in the a.f.d. process.

It has been found essential to process the material whilst in a frozen state, heat being applied while the foodstuffs are still frozen, which sublimates the ice without melting. This necessitates the application of high vacuum and carefully controlled heat to ensure that the foodstuffs remain frozen and that processing takes place within an economical period. The vacuum must be low enough to maintain the water content in a solid state while the sublimation heat is applied ; and 1 mm. Hg. absolute has been found to be a suitable maximum pressure for successful freeze-drying.

Until quite recently the heat for the sublimation of the ice has been applied to the foodstuffs by placing the product between heated plates which are closed mechanically until contact with the food is ensured. This method, while producing a satisfactory finished product, involved very long times,—anything up to 24 hours—which added greatly to the processing costs. Research undertaken by Aberdeen has resulted in a reduction of the drying times by up to two-thirds of the time previously required, and this has now made the process an economic feasibility.

This reduction in the drying times has been brought about by sandwiching the food between sheets of expanded metal. This serves a twofold purpose. It provides a vapour path from the food surfaces through the mesh and also improves the heat transfer from the heater plates to the food. Slightly higher drying temperatures may be permitted with the use of this mesh which helps to speed up the process. It is this advance in the system which has been given the name "accelerated-freeze drying."

The process may be applied to meats, vegetables and fruits, cooked or raw. A shelf life of two years may be expected when packed in air-tight containers, and no refrigeration is required.

While there is not a great reduction in the bulk of the food, there is dramatic reduction in the weight, which permits considerable economies to be made in transport and storage costs. The finished products retain their fresh appearance and colours remain natural, eliminating the need for chemical colouring agents. The food may be

Above: General view of the Vickers-Armstrongs plant at Mallow. Right: Food processed and packed in bulk lots for testing.



reconstituted almost immediately by immersion in water, and the result after cooking is virtually indistinguishable from that obtained when using fresh food, both in appearance and taste. More than 100 expeditions have been supplied with a variety of freeze-dried products, including Everest and Trans-Polar expeditions—strong evidence of the value and versatility of the new process.

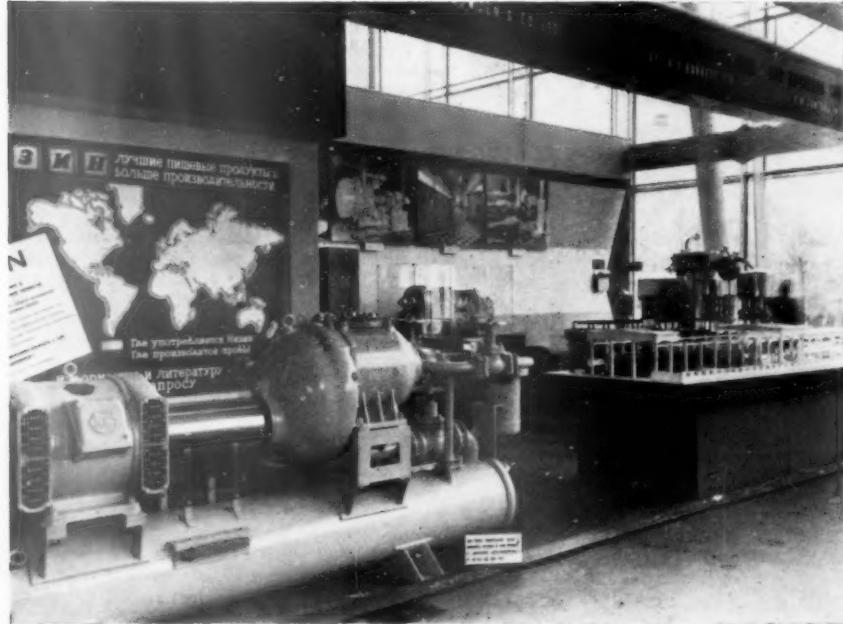
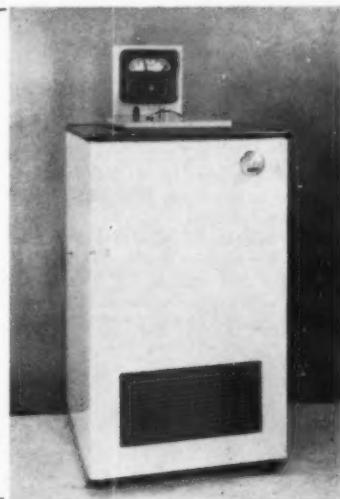
The Mallow plant operates on the process already described. The plates are heated by hot water circulation and the vacuum maintained by a four-stage steam ejector system. The drying cabinets are started consecutively at two-hourly intervals giving a throughput of five tons of "wet" food per day. The plant has been designed to facilitate 24 hour working to gain the fullest economical benefits and at the outset is processing fruit and vegetables.

U.S. Food Exhibit.—The American Embassy announces that the U.S. Department of Agriculture will have a market promotion exhibit of American foods September 5 to 23, at the new U.S. Trade Centre in London. It will be the first agricultural exhibit at the Trade Centre, which opened formally on June 26 with a housewares display. The centre is a joint project of the U.S. Departments of Agriculture and Commerce. This exhibit will mark the beginning of a series of agricultural displays to be held at intervals in the exhibit hall of the Trade Centre. Each will feature a different group of agricultural commodities, including food and non-food products. The September exhibit will have three main sections.

Vickers have also sold pilot apparatus to manufacturers in the U.S.A. with which they may carry out their own experimental work. This plant operates on the contact principle with electrical heating for the plates, but could also be adapted for radiant heating. The vacuum is attained by mechanical pumping; the condensable vapours are removed by refrigerated or water-cooled condensers working at -35°C or less.

In parallel with the accelerated-freeze drying system using the contact process Vickers-Armstrongs is undertaking extensive research on an infra-red system which does not require a plate closure mechanism. Initial continuous type plan incorporating infra-red heating is being designed to handle a throughput of 40 tons of wet food a day.

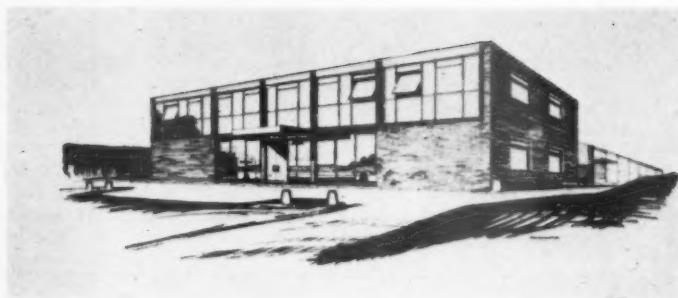
Lee's latest achievement is in low temperature refrigerators. This new model is being produced at less than £300, and will meet the requirements of small industrial training laboratories, universities, technical colleges, medical research establishments—in fact, any user who requires temperatures which can be pulled down to -100°F . in 1 hour and maintained at that level. Fitted with indicating thermostat, ON/OFF switch and indicating light, measurements of this new model are: External : 21 in. \times 21 in. \times 36 in. high; internal : 10 in. \times 10 in. \times 10 in. The tank will hold several gallons of liquid which can be pumped around secondary circuits thereby providing a flexible cold source.



The stand of U.D. Engineering Co. Ltd. at the British Trade Fair, Moscow. On the left is a UDEC-Howden screw compressor designed to operate with the UDEC range of packaged water chilling sets. This self-contained set, occupying only 87 sq. ft. of floor, has a capacity at 190,000 kilo cal./hr. in cooling chilled water from 4.4°C . to 1.7°C . UDEC are supplying a refrigerating installation to the Soviet synthetic rubber industry. It contains 18 of these screw compressors with a capacity equal to 9,000 tons of refrigeration.

NEW FACTORY for H.P.R.

Proposed new plant for Heat Pump and
Refrigeration Ltd. near Sevenoaks.



THE accompanying photograph is of the official ceremony of the laying of the foundation stone of the new factory which is being erected for H.P.R. Ltd. at Oxtord. The premises will consist of a large office block and a factory of 12,000 sq. ft. which will be purely devoted to research and development of heat pumps and other equipment.

The chairman, Mr. B. A. Reeves, said, in part : "I would like also to thank Mr. Sibley, my co-directors and all those responsible for this ceremony to-day, and for the handsome ceremonial trowel which must have been very difficult to find. I would like to say that this really



The chairman lays the foundation stone.

is only a private domestic ceremony since you all here present have some active personal interest in Heat Pump and Refrigeration, our growth and welfare : and so this is not a public affair. Perhaps in this connexion, the representatives of the Press would feel a little easier, if I explained at once my views on their presence with us. I look upon them always, as our friends and so welcome in any case. But to-day they are particularly so because we feel they are already so well acquainted with us, that they will, I hope, reciprocate our friendship. The *Kent Messenger* know us already as we are now situated so very close to them geographically at Charlton, and I feel sure they welcome our move to Oxtord, which is back to Kent and so can only be a good move. Our other friends from MODERN REFRIGERATION have been watching us equally long, growing since birth : I might even say prior to birth.

"Heat Pump and Refrigeration are developing work which has been going on for nearly some 15 years. Then, the heat pump was an entirely novel idea so far as anyone was concerned in this country, outside a laboratory. Practically no one had ever heard of it, although our great British scientist and inventor, Lord Kelvin, had enunciated the principle some 100 years previously. Such is the measure of our national phlegmatism. You can imagine therefore the immense handicap the developers faced, not only in finding a financial backer but also in persuading the tough, cautious—conservative I was going to say—British public to buy even one of these infernal machines. Guinea-pigs are not easily caught, as Mr. Sibley tells Mr. Kommedera 'First catch your guinea-pig and then manufacture your heat pump'.

"It is not hard to see, consequently, that speedy progress was unlikely along such an uphill road ; and our experience too has confirmed this. Two other peculiar obstacles have particularly obstructed us. Far from receiving recognition and helpful encouragement in our work, which is I think of national importance, we find that purchase tax so cripples our outlet in the domestic field that it is at present anyway quite uneconomic to pursue the obvious market. Then 'red tape,' that official bindweed of the bureaucrat's garden, has delayed this factory for upwards of 18 weary months. However, though still young, H.P.R. has parents, of substance, faith and determination, so these handicaps and obstacles, have not yet proved fatal. Lesser companies would and in fact have been forced to give up the unequal struggle, and failed.

"Up to date, there is no other British specialized factory than that being built here.

"We intend only to do research and development of units here up to the quantity production level which will be principally undertaken by our subsidiary company in Scotland.

"I think our work is nationally important because directly contributing towards raising the standard of living and even more importantly towards the national economy in the more efficient use of fuel, which to-day with Kuwait in mind is vital.

"The status, if any, we have so far been able to create for H.P.R. is due only to a combined effort of us all—everyone individually working as a team in our organization whatever his position (the tea-maker to the chairman), doing his job thoroughly and with enthusiasm, contributing only his very best to his very fullest, never satisfied except to give top quality and top service, to satisfy our customers, without whom our progress does not begin, so that we unitedly establish H.P.R. as no less than the Rolls-Royce in refrigeration."

M.P. VISITS U.D.E.C.

MR. TREVOR SKEET, Conservative Member of Parliament for Willesden East, paid a visit to the U.D.E.C. factories at Park Royal in June. Mr. Skeet is a member of the group of M.P.s who are helping the Minister of State, The Right Hon. F. Errol, to encourage exports.

Mr. Skeet, accompanied by Mr. G. E. Bonney of the south-eastern regional office, Board of Trade, were received by Mr. J. C. Taylor, managing director of U.D.E.C., and conducted around the production and assembly lines and saw machinery being manufactured for several export orders, including those from India, Yugoslavia, Israel, and the Philippines.

At the conclusion of the tour, Mr. Skeet said, "The Minister is, of course, very much concerned with encouraging the export of British goods. The Board of Trade has been impressed by the remarkable record of U.D.E.C. in exporting over 60 per cent of its entire production to what are recognized as some very difficult markets. We are gratified to learn of the valuable order which your sales organization has secured by enterprising participation in the British Fair in Moscow. As a member of the Export Group I have been very pleased on behalf of the Minister of State to come to U.D.E.C., to look around your factories and to talk to the director and employees responsible for such a splendid export achievement. I have been most impressed, and I am sure the Minister of State would have been, had time permitted him to make the visit himself."

Over the last year U.D.E.C. have exported industrial refrigeration plant and dairy, brewery and soft drink bottling plants to many countries of the world. Refrigeration plant includes a large-scale installation for a Soviet synthetic rubber factory.

Modern Factory Opened by Haynes & Oreno Ltd.

"COLDCRAFT WORKS," a new, spacious factory, has been opened at St. Paul's Cray, Kent, by Haynes and Oreno Ltd., Frigidaire distributors for South-east London and its environs. Fully equipped for all necessary manufacturing techniques, the new factory will enable Haynes and Oreno Ltd. to provide a comprehensive service in building refrigerated fixtures to customers' requirements and equipping them with Frigidaire cooling units.

The factory at St. Paul's Cray replaces smaller premises at Charlton, but Haynes and Oreno Ltd. will continue to operate from their head office at Peckham Road, London, S.E.15.

With a working area of 16,000 sq. ft., the factory provides ample space for a variety of products to be made on the premises. Specialists in "tailor-made" refrigerated window beds for butchers' shops and bottle cooling shelves for fitting in hotel and public house bars, Haynes and Oreno Ltd. have a constant stream of orders for this individual type of work, which can now be carried out, from start to finish, under one roof up to the moment of installation on the customer's premises. They also produce a number of self-service display cases to their own design, all cooled by Frigidaire.

In two large bays, the manufacturing operations are carried out by craftsmen to the high standards demanded for refrigeration fixtures, which require a high quality in materials and impeccable care in moisture and vapour sealing. Carpentry and joinery, sheet metal work, welding, soldering and stove enamelling are all carried out on the premises.

At the front of the factory is situated a ground floor showroom, with drawing office above and a large recreation room and employees' canteen. Immaculately finished in stainless steel, the kitchen was built entirely by employees, and fitted with Frigidaire refrigeration—of course!

"J.D." provide Insulation for new Ben Line Cargo Vessel

For the new s.s. *Bengloe*, built by Charles Connell & Co., Ltd., Scotstoun, "J.D." Insulating Co. Ltd., thermal insulation contractors of Liverpool, London, Glasgow, Newcastle and Southampton, have provided insulation to cargo spaces comprising four separate chambers and having a total capacity of 14,800 c.ft.

The deckheads, underdecks and bulkheads were insulated with Fibreglass Crown 125M slabs, retained in position with aluminium sheets and the top side of decks have cork insulation, finished with asphalt. The spaces are air cooled, and cooler casings, air ducting and full depth air screens were constructed of aluminium. Insulated doors, gratings and dunnage battens were also fitted.

The s.s. *Bengloe* is the 10th Ben Line vessel for which "J.D." have provided insulation, and is the third newest addition to their fleet. "J.D.s" Glasgow branch were responsible for completion of the contract.

The Frigidaire Division of General Motors Ltd., co-operated jointly in the organization of the eighth Self-Service Exhibition held in Partick Burgh Hall, Glasgow, from May 30 to June 6. Main feature of the Frigidaire show was the Talisman range, covering the needs of all the retail food trades.



The new St. Paul's Cray plant.

Air-Conditioning Scheme for New Delhi

BOTH cooling and heating are being provided by a York refrigeration plant for staff and families living and working in the recently completed U.K. High Commission compound erected in New Delhi by the Ministry of Works. The four year project was designed to bring together most of the personnel who were living in various quarters scattered throughout the city, and give them adequate modern accommodation with all amenities in the 25 acres site known as the United Kingdom Diplomatic Enclosure.

The compound includes a large office block, four blocks of flats, five houses for senior staff, a sick bay, swimming pool, and all associated buildings including the recreational building, generating station, plant room, etc. Air-conditioning is provided for those in the living and working areas using fan convector units circulating chilled water in the summer and warm water in the winter.

The central water cooling/heating plant was supplied by York Shipley Ltd., to the design of the Ministry of Works in London, the equipment being installed by the York distributor in India, Air-Conditioning Corporation. The plant consists of four York packaged water cooling systems each of 1,200,000 B.t.u./hr. capacity, and each comprising a multi-cylinder compressor direct coupled to a 130 h.p. Brook motor, shell and tube condenser, shell and tube water cooler, refrigerant float regulator and suction trap/oil still.

These units, which were completely prefabricated prior to shipment, were mounted on spring isolators.

The plant was designed to operate at a maximum summer condition of 115° F. dry bulb, with 30 per cent. relative humidity when chilled water is circulated at 45° F., returning at about 55° F. In the cooler months of November to March, hot water is circulated at approximately 120° F., returning to the plant at approximately 110° F. Warm water for heating is obtained by reversing the water flow across the refrigerating plant. Heat rejected by the refrigerant condenser is stored in a 20,000 gallon capacity thermal bank from where it is pumped around the site through a 6 in. main. Refrigeration load for the plant during the period when heating is required is obtained by cooling atmospheric air through the medium of the water being circulated over four forced draught cooling towers.

Condenser cooling water is circulated by six centrifugal pumps direct coupled to electric motors. Other pumps in the installation include six primary and six secondary chilled/hot water circulating pumps. The equipment is provided with all necessary valves to provide automatic operation, including capacity control of the compressors. Switch-gear for the various driving motors and electrically operated valves, supplied by Morecambe Electrical Equipment Co. Ltd. are grouped into two panels, ammeters and indicator lights being included to facilitate monitoring.

The office block, sick bay, recreational building and senior staff houses all have individual fan convector room units located beneath the window sills. These comprise coil, thermostatically controlled fan and renewable dry fabric filters, and admit up to 25 per cent. fresh air

through an adjustable damper. Each unit has a performance of 12,000 B.t.u. per hour.

The flats are provided with a ductwork system. Each flat has its own plant room reached from the servants' staircase, with cooling/heating space air-conditioning units with a performance of 36,000 B.t.u. per hour. Cooled/heated air is carried along a duct in a void above the corridor, and induced into the living spaces through grilles. It is extracted from the corridor through the void and passed back into the plant room where it is filtered, mixed with a proportion of fresh air and recirculated.

Senior architects for the Ministry of Works : R. P. Mills, A.R.I.B.A. and K. W. Judd, A.R.I.B.A., A.M.T.P.I., DIP. T.P. (LDN.), A.M.I.STRUCT.E., Engineer : C. H. C. Cooke, A.M.I.MECH.E., A.M.I.E.E.

Labour Force Reduced.—L. Sterne & Co. Ltd. of Hillington reduced their labour force at their domestic refrigerator plant by 440 at the end of last month. The Lord Provost of Glasgow and local M.P.s met the management to discuss the situation and were advised that unfortunately the notices of dismissal could not be extended owing to the position of the industry. Sterne's indicated that they had withheld the dismissals in the hope that the market would improve but that there had been no betterment in demand and that the company could not continue to carry the labour force any longer. A suggestion by the employees that the firm should manufacture for stock was not acceptable as the firm was already fully stocked. The dismissals came on the eve of the annual holidays and the company softened the blow by giving two extra weeks' notice beyond that originally intended.



General view of the U.K. High Commission Compound, New Delhi.

Welding Research Laboratory

Formally opening the British Welding Research Association's new 21,000 sq. ft. engineering laboratory at Abington last month, Lord Mills, a former Minister of Fuel and Power, told 900 guests that the research station, now capable of tackling any problem that may arise from the application of welding in industry, enjoys an international reputation and is unequalled anywhere in Europe—excepting Russia—or in the United States of America. Quoting the example of one of this most revolutionary discoveries—that of radium—which was made in an old shed, Lord Mills said that if ever there was a chance of making discoveries as a result of working in tumble-down buildings, "the Association's staff has certainly had it." He was referring to the old stables and ex-army huts at Abington Hall which, until the new building was commissioned, had housed the pres-

sure vessel, resistance welding and brittle fracture researches. Although nothing as far reaching as the discovery of radium had come out of the Abington buildings, the results of the work done had made an important contribution to the efficiency, reliability, and safety of welded plant used in many different industries and had substantially contributed to the high standard of welded design and fabrication in this country. After opening the laboratory, Lord Mills was presented with an inscribed paper knife by Mr. Robert Jenkins, chairman of the Association's council. The knife, which has been made at the research station, had a seam welded stainless steel blade and an argon arc-welded aluminium bronze handle. The ceremony formed the start of a two day exhibition of Research in Progress which was attended by over 1,200 industrialists, engineers, and representatives of scientific and professional organisations. In addition to the developments in conventional welding techniques and investigations shown, a friction welder built by the Association was demonstrated for the first time, and aroused a great deal of interest for

its efficiency and simplicity. Although mild steel specimens, only, were welded during the exhibition, examples were shown of successful welds, in a variety of forms, in light alloys, stainless steels and titanium.

* * *

Standard for Transport Refrigeration.—A new A.R.I. standard for variable-speed transport refrigeration units employing forced-circulation air-coolers, such as are used in refrigerated trucks, trailers, and railroad cars, has been published by the Air-Conditioning and Refrigeration Institute, Washington, D.C. The new document, "A.R.I. Standard 1120-61," is a companion to "A.R.I. Standard 1110-59." The new standard applies to units intended for high-temperature (plus 25°F. or above) and/or low-temperature (plus 10°F. or below) service. It establishes a specification of what constitutes minimum standard equipment; rating requirements; methods of testing; and proper marking for the equipment covered in the standard. It does not establish minimum specifications for, nor means for determining ratings of, refrigerated vehicles.

REFRIGERATION FOLLIES —No. 6

"All this, and heaven too—at 4s. 3d. a week!"





The

Summer Agricultural Shows

THE "Royal Show" of the Royal Agricultural Society of England is always an attraction—even to those with a fairly remote connexion with the land. But a change in the form of this annual exhibition is considered by many to be overdue.

Started in 1839, the show's fortunes have ebbed and flowed considerably. It will probably come as a surprise to many to learn that as far back as 1897 at Manchester the attendance was 217,980 persons which figure is much above the 1947/1961 average. The last four years have seen attendances below the 100,000 mark. It is clear that the Council of the R.A.S.E. intend to grapple with this problem and they may have the answer in siting the show on a permanent ground in Warwickshire—virtually the centre of England.

The present fall from popularity of "The Royal" was again reflected this year in the number of refrigeration exhibits in the trade section. The "old faithfuls" included J. & E. Hall, Prestcold, A.E.I., The Electrical Development Association, the Gas Council, Calor Gas and Gascoigne's. A relatively new exhibitor was Kenwood Manufacturing.

Kenwood's exhibit at approximately 50 outdoor shows during the summer and they do a most useful promotional job for the domestic refrigeration and home freezer fields by *really demonstrating* these appliances to the country housewives. They use a large semi-trailer type of mobile showroom, the side of which lets down to provide good working space.

J. & E. Hall featured "Chillwell" milk coolers in two



Prestcold's stand was the largest refrigeration display at "The Royal" this year.



sizes, a freezing tunnel for poultry, a model of a hydro-cooler for vegetables, refrigerated display cases for dairy produce and refrigeration compressors such as are used in milk collecting centres and creameries.

Prestcold showed their new ranges of "Nuvision"** and

of solid houses and pens for the animals, metalled roads and a show ring with a central control tower of which some airports would be proud. A record number of 430 trade stands were accommodated and there is now a waiting list. In 1960, the "Great Yorkshire" had an attendance of

- * The "Nuvision" cabinet was shown on page 620 of our June issue. Unfortunately, it was included with details of Prestcold's other new range, the OFC 382 "Retailer" and "Vendor" series. We apologize for any confusion caused.

Right: J. & E. Hall's display at "The Royal" at Cambridge covered a wide range of plant.

Their stand at Harrogate was similar. Below, The stand of The Produce Packaging Development Association included a fine display of prepacked fruit and vegetables in a Sherer cabinet supplied by M. L. Winsor & Co. (below right).



"Farmoor" display cases which created great interest, in addition to all "domestic" models and service cabinets.

Gascoigne's refrigeration exhibits included their "Rotorfreeze" milk cooler and a farm house freezer for food-stuffs.

Up north at Harrogate, the Great Yorkshire Show on a permanent site on the Wetherby Road revealed the great attraction of a fixed venue allowing the construction

105,210 persons on three days as against the "Royal's" 92,225 persons on four days.

At Harrogate, the "refrigeration banner" was carried by Prestcold (Leeds Office) Frigidaire (Southern & Redfern Limited), John Mollett Ltd., N.E. and Yorkshire Electricity Board, Calor Gas, Simplex Dairy Equipment Co. Ltd., Gascoignes (Reading) Limited and Alfa-Laval Co. Ltd.





Frigidaire (Southern & Redfern Ltd.) were at Harrogate but not at Cambridge.

Calor Gas are "regulars" at most summer shows and feature refrigeration.

Gascoigne's showed milk coolers and a farm freezer.

Frigidaire and John Mollett's stole this show with long frontages on to the main avenue. Frigidaire's displayed close on 30 pieces of equipment, including a 150 c.ft. butcher's coldroom, Zero stores for caterers, three-tier sales cases, immersion freezers for poultry and a full gamut of household refrigerators.

Mollett's had an excellent line-up of refrigerators, the main display being of Westinghouse models of which they are now sole concessionaires in the north.

The writer feels that the refrigeration industry would do well to foster more assiduously this lucrative market. The present rate of spending by U.K. farms is about £1,240,000,000 a year. While over £318,000,000 goes to meet the wages bill, nearly £97,000,000 to pay rent and interest on capital, the remaining £826,000,000 is spent on farm machinery, animal feeding stuffs, fertilizers and other farm equipment.

Recently supplied to Las Palmas was a refrigerated container built for Interglass S.A. by Mann Egerton of Norwich. The container has



6 in. thick expanded polystyrene as its insulation medium and has holdover refrigeration designed to maintain a temperature of -5° F. in an ambient temperature of 120° F. The container will be used to transport frozen goods by road and ship on and between the various islands in the Canary Islands group.

* * *

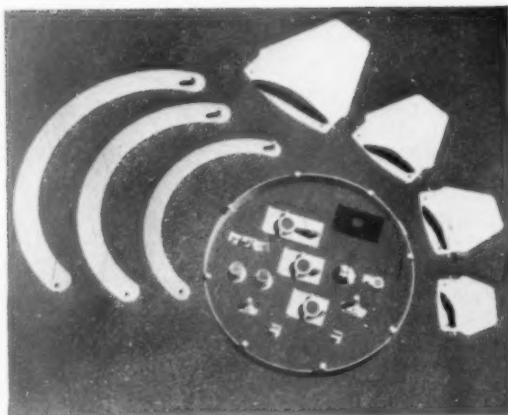
Polish Refrigeration Expert in U.K.—Now in the course of a two months visit to this country under the patronage of the expanded technical assistance programme of the Food and Agriculture Organization of the United Nations is Mr. Alexander Paliwoda, senior engineer at the Union of Cold Storage Plants, Warsaw. The purpose of his visit is to make a close study of methods

of refrigeration and the techniques employed by leading producers in the United Kingdom in freezing and storing foodstuffs.

Spending two days at Ross Group during his short visit to Grimsby Mr. Paliwoda saw the many activities connected with fresh fish and the complexities of frozen food production, quick-freezing and cold storage. At the offices and works of Jackstone Froster Limited—a Ross Group subsidiary company—manufacturers of quick-freezing equipment for the frozen food industry, he had discussions with Jackstone executives and saw Jackstone equipment in production and in operation at the Ross frozen food factories. Mr. Paliwoda is one of the leading authorities on refrigeration in Poland.



MAJOR
APPLICATION OF
"DELRIN" IN
U.K. IS IN NEW
RANGE OF
VENTILATING
UNITS



Selection of parts moulded from Du Pont's "Delrin" acetal resin, are seen in the new Vent-Axia unit. On the left are three of the four sizes of iris shutter blades. On the right are the four sizes of automatic shutter blades (there are eight in each unit). Within the actuating ring is a selection of moulded fittings including clips, couplings and coin-slotted fixing nut. The unit is available in black or ivory.

Strength and rigidity, stability, hardness, frictional and resilience properties are claimed to be the reasons for the choice of Du Pont's newest thermoplastic, "Delrin" acetal resin, in numerous components of a completely new range of British-made ventilating units. This is the first major United Kingdom application of "Delrin" in the field of domestic hardware which represents an important end-use area for this new material. The ventilating units, both window- and wall-fitting models, are made in a range of four sizes with impellers of approximately six, seven and a half, nine and 12 in. in diameter. Components of "Delrin" are used in both models and throughout the range of sizes. They are numerous and complex in shape.

REFRIGERATION FOR
HOSPITALS

The ever increasing use of refrigeration in hospitals is the subject of a recent publication by York Shipley Ltd. Entitled "Refrigeration for Hospitals" it deals with some of the more common applications including air conditioning, blood and drug storage, mortuary chambers, ice-makers and food storage. Reference is made to recent air-conditioning schemes at leading hospitals where operating suites are

being served by York plant. Mention is also made of the "Embassy" air conditioner, a self-contained package plant requiring the minimum of installation. For the provision of ice for oxygen tents, hypothermia, anaesthesia, cold therapy, etc., two ice-making machines are illustrated. Model B225 which produces up to 220 lb. of icelets in 24 hours, and Model DEB-2B which produces up to 250 lb. of ice per 24 hours in the form of clear crystal ribbon fragments or flakes. For the hospital kitchens and wards food storage cabinets are described and illustrated.

INTERNATIONAL GENERAL ELECTRIC APPOINTS JOHN L. SCHAFFNER
Manager, Consumer Goods Export Department

The International General Electric Company, New York, a division of U.S. General Electric, has appointed John L. Schaffner as manager of its consumer goods export department. Mr. Schaffner has been manager of one of I.G.E.'s sales sections since 1955.

As consumer goods export department manager, Mr. Schaffner will be in charge of promotion, selling, finance and services of G.E. consumer goods in markets outside the United States and Canada. Product lines handled by the department include communication products, electronic components, household appliances, lamps and lighting materials and chemical and metallurgical products.

Mr. Schaffner has been with G.E. since 1934 and with I.G.E. since 1935. He has had extensive experience overseas for G.E., having served in Colombia for more than 12 years in managerial and engineering capacities with General Elec-

tric de Colombia. He returned to the United States in 1961 to become manager, Industrial Sales, with I.G.E.

Lec's S.130 Redesigned

The Lec S.130 service cabinet, a commercial refrigerator with a capacity of 13 c.ft., designed specifically for caterers, hoteliers and shop keeper, has now been re-designed to incorporate a full-width freezer.

The freezer has a capacity of 1½ c.ft. and is fitted with two doors which open from the centre. Immediately below the freezer is a large full-width tray suitable for the storage of meat or fish, and which can also be used as a drip tray. Other special features include fully adjustable shelves, automatic interior light, thermostat control to adjust the interior to the required temperature, together with a fitted door liner to accommodate eggs, fats and two shelves for ample bottle storage. A floor space of only 30 in. by 27 in. is required for the S.130 which is designed to answer the problems of the hotel and catering establishments who need to combine maximum storage with minimum floor area. Powered by the Lec hermetically sealed refrigeration unit this cabinet remains at £115.

In a statement from Elliott-Automation Limited, it is announced that La Thermostatique S.A., the French subsidiary of the Rheostatic Company (itself a member of the Elliott-Automation Group) has now become a wholly-owned subsidiary of the group. Recently it was announced that Elliott's had acquired a part of the minority shareholding in La Thermostatique by an exchange of shares in that company for Elliott-Automation ordinary shares. The Rheostatic Company has now negotiated the purchase of the whole of the outstanding balance of the shares in La Thermostatique for cash, so that that company is now also a wholly owned member of the group.

SQUARE D LIMITED

Square D Ltd. announce a new range of oil-tight control units with greater versatility than their existing range, with this new range, the same combinations as before are available but can be effected with reduced stocks. The new range of all-metal pushbutton switches incorporates a removable plastic colour cap which can be one of seven colours, red, blue, green, orange, brown, black or yellow.

LARGE CAPACITY SEMI-TRAILER

Recently put into operation by Birds Eye Foods Ltd. for the transport of their peas is this refrigerated articulated unit—one of five built for them by Mann Egerton Ltd., of Norwich.

Drawn by a B.M.C. tractor unit and mounted on a Scammel semi-trailer the Mann Egerton refrigerated container has been designed and constructed to maintain a temperature not higher than -5°F. and has 5 in. thick expanded polystyrene as the insulating medium. As can be seen from the photograph the refrigeration equipment is a Thermo King model KL 20. This unit using forced convection type of refrigeration incorporates both an auxiliary petrol engine for use when the vehicle is on the road and a mains electric motor for use when stationary.

The load carried is stacked on to pallets and to prevent movement of the pallets due to acceleration or braking Mann Egerton have incorporated a system of portable loading. These boards slide into vertical channels on either side of the body interior and by virtue of their spacing can locate the load regardless of the number of pallets carried at a particular time.



The interior lighting is so arranged that the lamps are connected to the vehicle supply and three lamps are wired to a socket, whence they can be connected to a mains supply.

The complete articulated units were supplied by the commercial vehicle sales department of the Mann Egerton organization.

Refrigerated Transport Developments



NEW INSULATED VAN

THE Times Food Products Co. Ltd. (Tempo) have taken delivery of an insulated van, built to fleet specification, which will carry seven tons of quick frozen foods at a maintained product temperature of 0°F. over a period of up to three days. The refrigerant is solid CO₂ contained in a set of four bunkers of aluminium alloy construction which are mounted on the underside of the roof.

Each bunker is in the form of a tunnel 10-in. deep, and of a size to accommodate square blocks of dry ice. At the front end of each bunker is a thermostatically operated blower fan which controls the rate of evaporation and, therefore, the internal temperature of the van.

The frozen foods are carried on 10 pallets, each 4 ft. by 3 ft. 4 in. by 6 in. high. The internal loading space, totalling 1,000 c.ft., is 20 ft. 6 in. by 6 ft. 11 in. by 6 ft. 10 in.

Insulation

The insulating material used in the van is expanded polystyrene, density 16 oz. per c.ft. and is of 5 in. thickness. The body is vapour-sealed and waterproofed externally, with internal waterproofing only. The interior is panelled in 18 to 20 s.w.g. aluminium sheeting, supported on a framework of Jabroc or nylon spars. All internal joints are vapour-sealed and the walls coved to the non-skid floor, which is reinforced to take the necessarily high point of loading of the pallet truck wheels (2,080 lb. sq. in.)

Wall dunnage, consisting of 1 in. verticals at 2 ft. intervals, with 20 s.w.g. aluminium sheeting superimposed on the verticals, extends from the loading height to 2 in. from the floor.

Adequate vapour- and heat-proof doors, with sealing gaskets, are fitted and open the full width of the vehicle. Door fastenings are of the superfreeze type and a door locking device and retaining catches are fitted to hold the doors in a wide open position. Interior lighting is controlled from the driver's cab.

A distant reading mercury in steel thermometer, with the bulb located towards the front of the vehicle near the ceiling, is read by dial indicator in the driver's cab.

Thermal efficiency of the container is 65 per cent minimum.

The body, clad externally in 18 s.w.g. aluminium sheeting, is built on a framework of aluminium alloy (treated hardwood is allowed in specification) with no metallic connexion existing between the outer and inner frameworks. The chassis is a 7-ton forward-control Commer "Superpoise."

The bodywork, including insulation, was carried out by Homalloy Ltd., Southend.

A Better Atmosphere for Discussion

No matter how heated the discussions may become, the atmosphere will remain cool when the leaders of the British engineering industries and union representatives meet at the London headquarters of the Engineering Employers' Federation.

The Conference Hall at Broadway House, Tothill Street, London, S.W.1, has been provided with a complete air-conditioning installation designed to main-



Air-conditioned conference hall at Broadway House.

tain comfort conditions of 70°F. throughout the year. Mechanical control is provided by a split, packaged, air-conditioning system, with a capacity of 12 tons refrigerating effect, manufactured by Carlyle Air Conditioning and Refrigeration Limited, London.

The conference hall is approximately 50 ft. long by 30 ft. wide by 15 ft. high. It is used principally for the monthly meetings of the Federation's Management Board composed of about 90 members, and also for discussions between industrial employers and union representatives.

Formed in 1896 with a membership of 180 firms the Federation now has over 4,400 member firms employing nearly 2,000,000 people. The Federation represents the bulk of engineering production in the country, and is recognized by the Government as the national body representing the interests of employers in the engineering industry.

The air-conditioning system consists of a Carlyle type 38R12 fan coil unit complete with resistance type electrical heater battery which is located in the plant room. A separate air-cooled condensing unit is positioned on the roof of the plant room.

Conditioned air is delivered to the conference room by means of a main supply header passing through the plant room roof and running centrally across the roof of the conference hall.

Distribution within the room is through four large dropper ducts terminating in adjustable draught free ceiling diffusers. Return air is taken at low level from each alternate window sill on the east and west sides of the hall for its full length. The return air

ducts terminate within the plant room which thus becomes a plenum chamber.

Outside air is introduced into the plenum and is filtered before mixing with the return air. A further filter within the air-conditioning unit ensuring that the supply air to the conference hall is absolutely clean.

The air-conditioning system is controlled by Satchwell Duotronic electrical control scheme, consisting of a duct-mounted temperature detector actuating a multiple step controller for the heater battery and a refrigeration solenoid valve to control the leaving coil temperature.



Main supply header running the length of hall roof.

The installation of the Carlyle equipment was designed, supplied, and installed by the Fuel Efficiency Company Limited, who are one of the main dealers for Carlyle Air Conditioning and Refrigeration Limited.

Pulling Power of "MR"

To The Managing Director,
Refrigeration Press Ltd., London S.E.1.

Dear Sir,

We should like to take this opportunity of expressing our appreciation of the excellent results from our recent advertisement in MODERN REFRIGERATION.

The interest shown in our new range of heat barrier air curtain equipment has almost doubled sales in a remarkably short period. In addition, enquiries have been received from many overseas countries including Norway, Malta, East Africa and Northern Ireland.

We have decided to insert a regular series of advertisements in your magazine.

Yours faithfully,
R. VINEY BROWN,
p.p. Thermoscreens Ltd.
420/422 Ware Road, Hertford.

Scottish Store Owners in Conference

At the 22nd annual general meeting of members of the Scottish Association of Cold Storage and Ice Trades held at the Imperial Hotel, Aberdeen, excellent representation was recorded, members coming from all parts of the country. Those present included Mr. D. Knowles (Aberdeen Ice Co. Ltd.), and New Standard Cold Storage (Aberdeen) Ltd., Mr. F. J. Worling (Aberdeen Ice Co. Ltd.), Mr. B. S. Bellamy and Mr. F. L. Nugent (Aberdeen Cold Storage Co. Ltd.), Mr. E. C. Malcolm (Aberdeen Market Co. Ltd.), Mr. T. Hamilton (Buttercup Dairy Co. Ltd.), Mr. A. Ferguson (Clyde Cold Storage Co. Ltd.), Mr. M. Lawson (Dundee Cold Storage Co. Ltd.), Mr. J. F. Chicken (Edinburgh Ice & Cold Storage Co. Ltd.), Mr. G. W. Will (Fraserburgh Ice & Cold Storage Co. Ltd.), Mr. J. H. Dunningham (Granton Ice Co. Ltd.), Mr. G. R. Leith (Kirkwall), Mr. R. Finlay and Mr. J. F. McArthur (Wm. Milne Ltd.), Mr. D. Thompson and Mr. G. L. Thompson (Moray Ice & Cold Storage Co. Ltd.), Mr. J. Mackenzie (The North British Cold Storage & Ice Co. Ltd.), Mr. C. Birse and Mr. J. Gill (Northern Co-operative Society Ltd.), Mr. J. L. Brownlie (Corporation of Paisley), Mr. D. H. Swankie and Mr. E. H. Stewart (Scottish Co-operative Wholesale Society Ltd.), and visitors were Mr. M. Wyllie, L. Sterne & Co. Ltd.; Mr. J. E. G. Ruddin, president, The National Federation of Cold Storage and Ice Trades; Mr. A. D. Hillhouse, general manager, National Cold Stores (Management) Ltd.; and Mr. D. T. Lee, secretary, The National Federation of Cold Storage and Ice Trades. Apologies for absence came from The Crystal Ice & Cold Storage Co., Edinburgh; The North of Scotland Ice Co. Ltd., Wick; J. & M. Shearer Ltd., Lerwick; Mr. R. G. Bunday, Union Cold Storage Co. Ltd., London; Mr. C. A. Fearon, Union Cold Storage Co. Ltd., Glasgow; Mr. J. M. Lamb, Falkirk, associate member; Mr. T. A. Raymond, managing director, Refrigeration Press Ltd.; and Mr. A. T. Robinson, Belfast.

At the outset the chair was occupied by Mr. James Mackenzie, the retiring president of the Association, and thereafter by Mr. Alex. Ferguson following upon his election to that office.

Mr. Mackenzie, in opening the meeting, extended a welcome to those present and made reference to the absence of Mr. W. A. P. Milne due to the illness of his wife. All present signified their regret at the reason for Mr. Milne's absence, and Mr. Mackenzie was asked to convey to him their best wishes for Mrs. Milne's early return to full health.

In presenting his presidential report, Mr. Mackenzie said in part: "I take this opportunity of referring to ICE first of all in my opening remarks.

"The modern, efficient, hygienic and attractive product of the manufacturer of refrigerated cabinets and small cold rooms has almost completely superseded the use of ice by the so-called town trade which reached its peak immediately prior to the second world war. The only factor which made the continuance of this town trade possible and profitable immediately after the war was the fellowship fostered by this Association during the war years. This fellowship encouraged ice factory management in certain areas to organize the controlled manufacturing of ice, by collective methods of production and delivery, more efficiently and economically than ever before. A reasonable and agreed frequency of delivery instead of previous uneconomic duplication of vehicles and routes prevented very serious increases in costs being passed on to the customers during that transitional period.

"This is the 22nd annual general meeting of your Association and I am advised by one of our members that the average selling price in his district, primarily to trawlers, has increased only from 16s. 6d. per ton in 1938 to £1 7s. 6d. in 1960. I doubt if any of us can name a manufactured article, the price

of which has increased only by 67 per cent. in the 22 years this Association has been in existence. During this period electricity has been doubled in price and wages have increased four times—to name only two of the charges which are among the heaviest items of our costs.

"The majority of our membership has been served with re-valuation notices which indicate an increase in assessment of up to four times and in which connection I am no longer optimistic about the anticipated partially compensating reduction of local rates. The eventual loss of de-rating by the ice factories will be an additional and very heavy blow. Considering these two items alone, I wonder if it would not be a wise move to examine seriously these very substantial increases in costs which must eventually be passed on to the customer if the industry is to continue to function efficiently and operate sufficient stand-by equipment to meet the seasonal fluctuation in demand for supplies of ice.

"Most of us are very seriously perturbed by the concentrated magnitude of the proposed increases in valuation assessment and I believe it would be most unwise to delay too long the completely justified passing on to the consumer of some of the increases in costs which have taken place during the past five years.

"Recent articles in technical magazines regarding the costs of producing flake ice are right and proper only for as long as they are not misleading. The costs of producing ice over an annual period of not less than 12 months is very different from the cost of making one ton of ice. Even with automation, there is no end to the costs of depreciation, deterioration and eventual replacement.

"As I have referred to 're-valuation' I would remind you that our Association has circulated all members with a view to collecting information on this subject. At the same time members were advised that Mr. J. Cassels Pinkerton, C.B.E., M.C., B.L., F.P.R.I.C.S., had been invited to prepare and present any appeals which members might care to present through our Association.

"For most of us the cost of electricity is one of our heaviest items of expenditure. It is a constant source of disappointment to your committee that they have not made any progress in preparing a new approach to the North of Scotland Hydro Electric Board with a view to obtaining supplies of electricity by whatever arrangement, at a cost approximating to other areas. Even the most fervid Scottish Nationalist must believe that a high price is being paid—and in peculiar circumstances—for electrical power in the Highlands and Islands.

Co-operation in Ice Field

"As far back as 1946, this Association was interested in the possibility of a consortium of members providing ice manufacturing and fish freezing facilities in the Highlands and Islands and I seem to remember discussing the possibility of obtaining supplies of cheap electrical power with an enthusiast who eventually became Sir Edward McColl. At that time I was under the impression that 'cheap power' was the primary inducement for industry to investigate the potentialities of Highland labour and thereby prevent further depopulation. It is very evident that increasingly dear money has made it impossible for this ideal to be fulfilled so far, but I believe this problem will have to receive increasing attention from the Government if industry is to be encouraged to move into the more northerly parts of Scotland.

"Cold storage charges were re-arranged at the beginning of this year and all members have received copies of the rate cards issued by the Glasgow Cold Storage Association, and applicable from February 1, 1961. I would take this opportunity of thank-

ing the Glasgow Cold Storage Association for making these cards available to us.

"One of the rates under re-consideration at the present moment is that applicable to oven-ready turkeys to be stored at sub-zero temperatures. It is a fact that accommodation required for this commodity could earn three times as much revenue on goods with a better weight to volume ratio. This traffic is a very exacting one and a great amount of recording and separating of types is involved on 'intake' and 'release.' Our customers have had a very fair deal over a long period and I do not think they will be completely unappreciative of this fact.

"Occasionally in trade publications, there are criticisms of the charges levied by the cold storage industry and we must always pay attention to constructive criticism. Comparing old with new cold stores, I sometimes wonder what the costs of repair and replacements will be on the modern forms of construction and insulation in 60 years' time as compared to the older buildings now used as public cold stores for over 60 years. So far as working costs are concerned, there is no doubt in my mind that 100 per cent. mechanization or palletizing is impossible in a public cold store. You may consider that a reckless statement but I would remind you there is an increasing requirement for cold stores to accept inwards and deliver outwards a greater variety of commodities to be handled by code or date rotation. To handle these goods accurately results in an initial loss of about one-third of nett storage space, and this apart from normal seasonal fluctuations in demand. To go up in height to 20 ft. or so is not always feasible in terms of shape, stability or strength of package, and in my opinion is only applicable and justified where bulk stacking of about 1,000 tons of one type of commodity is on offer.

"The purchase and proper use of post-pallets is quite beyond the scope of the majority of public cold stores until such time as pre-packaging is universal and standardized.

"For some time I have been advocating the consideration of charges between 30s. and 40s. per ton for handling goods into and out of cold store where some form of pre-rental of space was under consideration. There is no doubt in my mind that with rapidly increasing costs, we have to think in terms of 4s. 6d. per cubic foot per annum as a reasonable annual return on genuine sub-zero space.

"The proposed revaluation of property alone looks like adding at least 3½d. per annum per c.ft. of net space to the annual costs. In South Scotland, electricity has already been increased from 13s. 9d. to 16s. 9d. per K.V.A. per month and wage increases are a near annual event.

"Despite the quite staggering increase in cold storage space built or being built by private firms to hold their own goods, I believe our greatest problem is the eventual method of disposal of the remaining Government cold stores. Our industry is still unanimous that the present management company is the proper and logical method of operating this national asset.

"Looking back at the excellent talk last year by Mr. J. C. Forrest, B.Sc., A.M.I.MECH.E., on 'The accelerated freeze-drying process for foodstuffs,' I feel that such methods of preserving food are at present somewhat limited in their scope and economy of operation, as compared to modern quick-freezing, but it is very evident that the cold storage industry must give absolutely accurate temperatures related to the physical properties of the commodity and the length of time it is to be cold stored.

"As an Association, our closest link is naturally with the National Federation of Cold Stores and Ice Trades and we are pleased to have Mr. Eugene Ruddin with us again on this annual occasion. I would like to say thank you to Mr. Ruddin and Mr. Lee for their many kindnesses when we meet in London.

"My thanks are also due to all members of committee of our own Association for their valued support during my years of office and I know you will approve if I say an extra thank you of my own and on your behalf to Mr. Walker for his efficiency and the excellence of his efforts on behalf of our Association.

"I would conclude my report by saying that more than ever it is absolutely vital that we all work together as an industry to provide efficient and reliable services to our customers and thereby hope to obtain a reasonable return from our endeavours."

The annual dinner of the Association was held on the first evening when the toast list was as follows : "The Association," proposed by Mr. D. T. Lee and replied to by Mr. Alex. Ferguson, the new President ; "The Guests," proposed by Mr. James Mackenzie and replied to by Mr. J. Gill ; "A Vote of Thanks" (including the artistes), Mr. Alex. Ferguson.

The annual golf competition was played over the Banchory course when the principal prize-winners were as follows : 1st Class—1st, Dr. F. Clark, Aberdeen ; 2nd, J. F. McArthur, Glasgow ; 3rd, J. M. Low, Aberdeen. 2nd Class—1st, D. Cowell, Dartford ; 2nd, J. Mackenzie, Edinburgh ; 3rd, D. T. Lee, London. Ladies—1st, Mrs. A. Ferguson, Glasgow ; 2nd, Mrs. J. Mackenzie, Edinburgh ; 3rd, Mrs. A. D. Hillhouse, London. The proceedings followed the usual pattern and all present enjoyed themselves thoroughly.

CONTINUED EXPANSION OF THE TEDDINGTON ORGANIZATION

To give practical expression to the Government's urge to increase exports, the Teddington organization has formed a new company at Sunbury-on-Thames, **Teddington Controls (Export) Ltd.**, to expand and develop the overseas sales of the products of:

Teddington Refrigeration Controls Ltd., Teddington Industrial Equipment Ltd. and Teddington Auto-controls Ltd.

The managing director is Mr. E. Burman, who has been associated with the Teddington Group of Companies for nearly 30 years and who is well known to the many home and export customers of the Teddington Group.

The sales manager of the new company is Mr. L. E. Bayliss, who for the past 18 months has been

working closely with Mr. Burman in developing the Group's export sales.

* * *

The British Materials Handling Division of **The Yale & Towne Manufacturing Company** held a three-day sales conference at Wolverhampton recently, under the chairmanship of Mr. W. A. Galbraith, sales director. The home field sales force of the Division, in a very full programme, heard case study papers of applications of the various items of materials handling equipment sold both at home and overseas, and it is interesting to note that the range Yale now offer is the largest in the world. Mr. J. O. Sewell, managing director of the company, addressed the delegates, and in reviewing the current position of Yale spoke both of the excellence of the Yale product and the confidence he had in both the products

and the sales force. The conference acted as host to many overseas guests.

* * *

Especially suitable for self-service cheese packaging is a new film recently developed by **The Goodyear Tyre and Rubber Company (Great Britain) Ltd.** It is known as "Vita-film Grade F.10" and comes in four gauges. Because it is economical, due to its high sq. in. yield per lb., the 50 gauge is recommended for wrapping $\frac{1}{2}$ lb. and 1 lb. portions of cheese for self-service and similar. Cost of wrapping a $\frac{1}{2}$ lb. portion of cheese with a 10 in. square of this gauge film, for example, would only be 0.188 pence.

Apart from cost, "Vita-film" claims many other outstanding qualities. It has a high degree of clarity ; good shelf life and tight wrap.

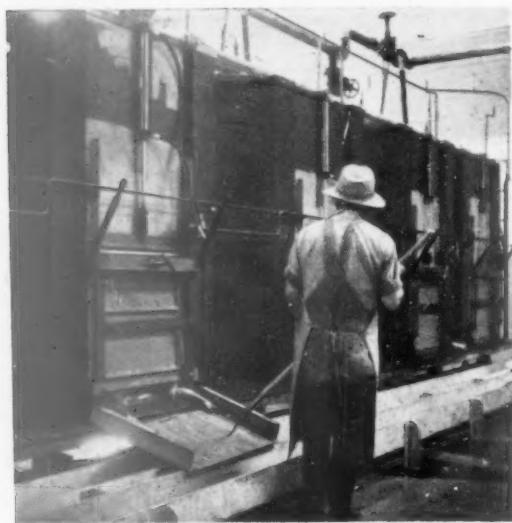
REFRIGERATED BRINE STORAGE

British Columbia Development

B RITISH COLUMBIA salmon canners lose no opportunity to exploit scientific developments which may help to increase plant efficiency. Most recent example of this is seen in the new "push-button" cannery now completed and in use by Nelson Brothers Fisheries at Steveston, British Columbia.

Among many innovations in the new Steveston cannery is the first steel refrigerated sea water storage tank system used in a fish cannery, replacing conventional wooden fish bins. A series of 10 connected tanks, 70 feet in total length and 16 ft. wide, will hold at capacity 350,000 pounds of fish dry and 250,000 pounds in refrigerated brine. The principle involved is the storage of fish in brine at a constant 30°, the temperature which has been found to be most effective in keeping fish fresh over extended periods.

Fishing boats and fish packers equipped with this



View of first steel refrigerated brine storage tanks in a fish cannery, with fish being removed for canning.

type of storage use sea water. In the cannery fresh water is used with salt added to bring the brine up to two per cent. salinity. This amounts to approximately one 100 lb. sack of salt per tank. The brine is cooled to the required temperature by a single-unit heat exchanger which can cool any or all of the tanks. Brine is centrifugally pumped from the tanks through the heat exchanger and back into the tanks. A thermostat regulates the temperature at an even 30°.

The heat exchanger consists of brass tubing coils

through which passes "Freon" 12 refrigerant. This is a radical departure from the steel coils and ammonia more generally used in fish refrigeration. The inner surfaces of the tanks are protected with paint and each tank is insulated with 2-in. waterproof foam-glass. Salmon unloaded at the Steveston cannery wharf, a few feet distant from the storage tanks, pass directly into the tanks, after sorting, on conveyor belts. Once in storage they remain at 30° temperature until they are removed for canning.

Many advantages are claimed for this new system of fish storage. From a sanitation standpoint it is said to be a marked improvement over wooden fish bins, the tanks being easily and thoroughly cleaned by hosing. Sterilization can be effected by adding sterilizing agents to the cleansing water. For the cannery operator the new method means a saving in money and more efficient organization. With older type wooden fish bins it is necessary to keep the cannery operating just so long as any fish are in the bins, since in this type of storage spoilage is rapid and inevitable after a relatively short period of time, depending on the species and condition of the fish. With the new refrigerated brine storage tank, fish could be kept safely for as long as a week if necessary. This means that the cannery can operate on a five-day, 40-hour week, eliminating overtime and the possibility of fish spoilage.

The addition of minute quantities of aureomycin, now an accepted procedure in fish preservation in Canada, renders the chance of spoilage even less likely.

Origin

The origin of refrigerated brine cooling systems is credited to Dr. A. G. Huntsman of the Fisheries Research Board of Canada. In 1931, in the Maritimes, Dr. Huntsman advanced the theory that while freezing temperatures caused some breakdown of tissue in fish, and therefore loss of freshness, near freezing temperatures would halt the advance of bacterial action without damage to the flesh. At the board's Vancouver Station J. S. M. Harrison and S. Roach began work, in 1953, on the problem of cooling and maintaining fish at the desired low temperatures. This work was closely correlated with that of Dr. H. A. L. Tarr, who was then making important discoveries in testing the use of antibiotics as food preservatives.

Repeated tests indicated that fish would retain their freshness for considerable periods at a temperature of 30°. The use of brine as the contact agency was the next step and practical application followed.

First tests under practical conditions were made in fishing boats and fish packers. Several improvements have since been made and now the fishing industries of British Columbia and the United States on the Pacific coast are making increasing use of this principle of fish storage.

Acting in a consulting capacity for the Steveston cannery installation, Mr. Harrison and Mr. Roach found the planning relatively simple. Space was no problem; and ample power was available from the all electric cannery.

The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENTRAL 4694).

1st INTERNATIONAL CONGRESS OF FOOD SCIENCE AND TECHNOLOGY

THE 1st International Congress of Food Science and Technology is to be held in London from September 18 to 21, 1962.

The programme has been planned on a broad and comprehensive basis with a view to attracting the fullest possible attendance from food scientists and food technologists throughout the world. The congress will also provide an opportunity to form, if desired, a governing body for planning future international congresses and other international activities. The programme is divided into four sections, which will run concurrently throughout the four days of the congress except for a number of periods devoted to plenary sessions and congress symposia.

Copies of the programme and forms of application for membership of the congress may be obtained from the Honorary Secretary, 1st International Congress of Food Science and Technology, 14 Belgrave Square, London, S.W.1.

EVENING CLASSES IN REFRIGERATION 1961-62

EVENING classes in refrigeration will shortly be commencing at technical colleges in various parts of the country. These classes cover two distinct courses of study. One of the courses, that for the City and Guilds of London Institute syllabus no. 73, in the Science and Technology of Refrigeration, is intended for the student who wishes to obtain a professional qualification and to qualify for corporate membership of the Institute; certain pre-entry qualifications are required by persons enrolling for this course. The other course, for the City and Guilds syllabus no. 72, in Refrigeration Practice, is primarily designed for those who desire to become qualified as refrigeration servicemen.

The Science and Technology of Refrigeration

Evening classes in the Science and Technology of Refrigeration will commence at the National College for Heating, Ventilating, Refrigeration and Fan Engineering, Borough Polytechnic, Borough Road, London, S.E.1, towards the end of September. The course, which extends for two years, is in preparation for the City and Guilds of London Institute Syllabus no. 73, which is the examination for corporate membership of the Institute of Refrigeration. Intending students must be over 21 years of age and should

hold the ordinary national certificate in mechanical engineering (including applied heat or heat and heat engines) or an equivalent qualification.

The college will be open from 5.30 to 8 p.m. on the evenings of September 18 and 19 for the enrolment of students for evening courses. The director and members of the staff will be present on each evening to advise students on suitable courses of instruction. The fee for students residing within the administrative County of London and most of the adjoining counties is £2 10s. for an evening course consisting of two or three evenings a week. In some cases, students who reside outside the administrative County of London will be required to furnish vouchers from their local education authority. Particulars may be obtained on application to the secretary of the college. The Governors require all part-time students to pay a fee of 1s. 6d. a year for membership of the Borough Polytechnic.

Refrigeration Practice

It is believed that courses in Refrigeration Practice, in preparation for the City and Guilds of London Institute Syllabus no. 72, are to be held at the following colleges:—

Willesden Technical College.
Llandaff Technical College.
Bognor Regis Technical College.
Nottingham People's College of Further Education.
Southampton Technical College.
Port Talbot College of Further Education.
Stowe College, Glasgow.
Dublin Technical College.
Colwyn Bay Technical Institute.
Norwich City College.

Enquiries concerning these courses should be made to the principals of the colleges.

It is possible that courses would be arranged at other technical colleges provided there was sufficient local demand.

UNIVERSITY OF LEEDS

Degree Courses in Food Science

NEW courses, leading to honours and ordinary B.Sc. degrees in food science, have been introduced at the University of Leeds. The first students for these courses will enter the University in October, 1962. The honours course extends over four years, and includes chemistry, physics, biology, statistics, bacteriology and biochemistry, taken in the

appropriate pure science department in the first years. This is followed by courses in the chemistry, physics, and microbiology of foodstuffs and food processing.

The ordinary degree course is restricted to three years. Entry requirements include a high standard in chemistry and physics, with mathematics as the preferred third subject.

The Proctor Department of Food and Leather Science, under the Proctor Professor A. G. Ward, has grown from the former Department of Leather Industries and will receive extended premises and additional staff for the new course. Postgraduate

students will be able to take the postgraduate diploma in food science, involving study and research, or carry out research for the M.Sc. and Ph.D. degrees. Research is already in progress or planned in several branches of food science.

Graduates of the department will be equipped to enter research, or to adapt their basic knowledge of food science for the varied tasks which world food problems and the needs of the industry may set.

Further details may be obtained from: Professor A. G. Ward, Proctor Department of Food and Leather Science, The University, Leeds, 2.

Air-Conditioning a New Hospital Block

A SCHEME for the complete air-conditioning of the whole of its four operating suites is one of the main features of the recently completed surgical block at Guy's Hospital, London.

This is the first of England's teaching hospitals to undergo any substantial building development since the war, and its new eleven storey block, built at a cost of more than £1,754,000, embodies many important advances in hospital design, with particular attention to the care and comfort of the patient, and the conditions under which he receives treatment.

The four surgical suites are on the first floor, two in the east wing, and two in the west wing. Each suite comprises two operating theatres, two anaesthetic rooms, with rooms for scrub-up, wash-up and sterilizing. One theatre in each suite has a glass dome for observation from the floor above.

Air-conditioning is at present supplied only to one of the suites, provision having been made for the extension of the scheme at a later date. The service comprises a supply and extract system for the air-conditioning of the theatre and anaesthetic room, with one ventilating and plenum supply and extract system serving the remaining rooms.

Design Requirements

The plant has been designed to maintain a temperature of 70° F. with provision for a 5° variation up or down. The supply to the theatre is downward displacement, holding a positive pressure, with 23 air changes per hour. The sterilizing and wash-up each have 20 changes per hour and anaesthetic room 18 changes. Relative humidity is maintained at 60 to 65 per cent.

The equipment, which is housed in a plant room on the second floor of the centre block, comprises pre-filter, fine filter, air washer, supply and extract fans and ancillaries, with the inclusion of separately located zone reheaters. The ducting is contained in a 3 ft. deep ceiling space over the main corridor and distribution is through patented type ceiling diffusers which hinge open for cleaning. Noise generated within the ducting is absorbed in acoustically lined chambers which also house the zone heaters.

The plant operates on a dew point control system using spray water calorifiers with hot or chilled water as conditions demand. A three-way modulating valve in the primary water piping to the spray water calorifier, and controlled by the dew point thermostat, regulates the dew point temperature when the plant is operating on the heating cycle.

All automatic valves for zone heaters are installed in the plant room. A control panel is provided for the control of all air-conditioning and ventilating equipment for each suite, and is located in the corridor adjacent to the theatres. Starting and stopping the plant is carried out remotely from this panel.

The water chilling plant is arranged for automatic control with capacity variation according to the cooling water requirements, and is designed to chill water down to 38° F. The plant is located in a separate plant room in the lower ground floor and the water is circulated by two centrifugal pumps. Provision is also made for the circulation of chilled water to the lecture room when necessary, which has been supplied with its own small plant.

A feature of the compact economizer condenser, which, in this instance, incorporates a sub-cooling coil for increased capacity, is the use of air and water flow over the refrigerant coils to achieve condensing with the minimum of water make-up. This type of unit is suitable for both inside and outside installation.

Future Extension

The plant has been installed on the basis of future extension with foundations laid down to receive an additional V/W compressor unit, while the Baudelot base tanks, framework and panels are arranged to accommodate two more coils.

The ward kitchens and lavatory areas on each floor have a separate supply and extract system with a fan unit on the roof and supply from the second floor plant. The central sterile area, to which all utensils and instruments other than theatre instruments are sent by special lifts, has its own extract and supply system on the lower ground floor. The wards themselves have natural ventilation.

Hot water supply and heating is provided by calorifiers fed from the main steam supply which is delivered from the central boiler house at 100 p.s.i. reducing to 65 p.s.i. on route. The calorifiers all incorporate the manufacturers specially indented tubes. In addition to being withdrawable as complete units the tubes of each battery are individually detachable for cleaning, inspection or replacement as necessary.

Heating for warm air circulation is provided by two horizontal non-storage heating calorifiers, each transmitting 2,500,000 B.t.u.s per hour.

The complete water chilling plant was manufactured and supplied by the well-known makers on the North Circular Road.

SHOP REFRIGERATION NEWS



Retail Butchers are Progressive

By Our Special
Correspondent



Fig. 2.—The back view of the counter—a four-door reach-in refrigerator—from which Mr. Hill is seen withdrawing a joint of meat.



Fig. 1.—Three media of refrigeration in Mr. W. Hill's shop at Deritend, Birmingham, are to be seen in this view; the counter, the cold-room, and the q.f.f. cabinet, all supplied by Stanley Refrigeration Ltd.

the very high percentage of fruit shops selling quick-frozen foods, greengrocers lag a long way behind. In regard to the last mentioned, however, I feel I ought to add that, judging by recent examples, retailers of fruit and vegetables are coming round to an appreciation of the value and potentialities of refrigerated display.

An increasing number of Birmingham butchers, I was told on my last visit to that city, are making use of what are known in this area as refrigerated block-counters. These are fixtures combining the normal functions of a marble-topped, serve-over counter with those of a low-level, reach-in refrigerator.

One example of what I mean is seen in fig. 1 and 2, showing, respectively, front and back views of one of these refrigerated counters in the shop of Mr. William Hill at 182, High Street, Deritend, Birmingham, 12. It is 9 ft. long by 2 ft. 9 in. wide, and four doors at the back provide easy access to the contents consisting mainly of joints cut up in suitable sizes ready for sale and of other items for which there is a steady demand.

This is another example of an all-refrigerated shop. There is a compact cold-room, held at 20° F. in the back left-hand corner, and, immediately adjoining it is a small office built to the same height and finished to blend with its general design.

Set at right-angles to the counter is an Iwo Frys low-

SHOP REFRIGERATION



Fig. 3.—The well-packed refrigerated window to which Mrs. Hill senr. is adding a final item.

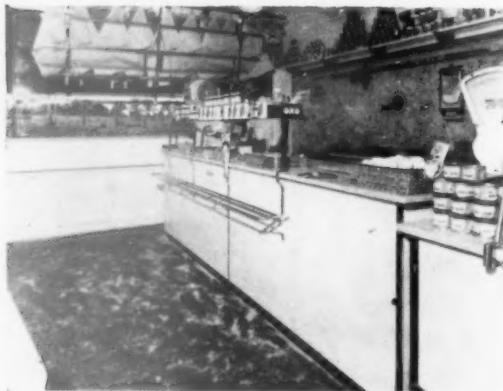


Fig. 4.—There is ample space in Parker's shop at Ilford for easy inspection by customers of the contents of the refrigerated window.



Fig. 5.—... and also of the contents of the large well-filled two cabinet for frozen foods.

temperature display cabinet for quick-frozen foods of 15 c.ft. capacity and the window slab, which carries a remarkably representative display, is also refrigerated. All the refrigerated equipment in this shop was supplied and installed by Stanley Refrigeration Ltd., of Birmingham.

I shall be returning to Birmingham at a later stage in this month's survey of retail developments. But, before doing so, I want to take you to Essex for another example of a butcher's

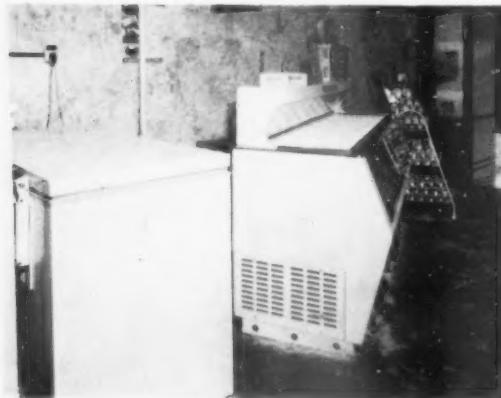


Fig. 6.—Immediately beyond the frozen food cabinet is a Universal deep-freeze cabinet for reserve stocks of frozen foods.

shop using four different types of refrigeration. This one is at Claybury Broadway on the Claybury Estate at Ilford. Trading under the name Parker, the owners are A. H. Carter & Sons (incorporating Parker Ltd., of Woodford, Essex) who have another branch at Loughton.

In this quite spacious shop, well planned to give plenty of freedom of movement to customers, there is a long refrigerated window (12 ft.), with a door built into the back for access to the machinery beneath. A long non-refrigerated service counter runs at right-angles for the full depth of the selling area of the shop with a cashier's desk at the far end.

Behind or virtually forming part of a screen dividing the selling from the working area is a counter-height refrigerator, the top of which provides a working surface for the slicing and mincing machines.

Set at an angle on the right-hand side of the shop is an Iwo



Fig. 7.—... and behind the screen separating selling from preparing area is a refrigerator the top of which provides a working surface for the slicing and mixing machines.



Fig. 8.—A deep-freeze alongside a q.-f.f. cabinet in Mr. Vincent's shop at Deritend, Birmingham.

Frys low-temperature display cabinet for quick-frozen foods. Immediately beyond this conspicuously-sited display feature, and backing on to the office is a Universal deep-freeze cabinet used solely as a holding medium for reserve quick-frozen food supplies. The two first-mentioned items were installed by Marketing and Maintenance Ltd., of Brentwood, Frigidaire distributors for this part of the country, and the last two by Stephenson and Smith, of Epping.

I am returning you to Birmingham now to show another

example of use of four kinds of refrigeration : this time in a fish shop which also employs a deep-freeze cabinet in conjunction with a quick-frozen food cabinet. This shop, belonging to G. M. Vincent Ltd., is at 156, Alcester Road, Moseley, has a cold room, a refrigerated slab for wet fish, as well as the two cabinets just mentioned. The slab is of the glass-covered type with a sloping glass screen in front and is set back a foot or so from the window slab which also is faced with a sloping glass screen. Both the deep-freeze and the quick-frozen food cabinets are Iwo Frys models supplied by Stanley Refrigeration Ltd., and the slab is by Prestcold. Mr. Vincent uses the deep-freeze cabinet for reserve supplies of frozen foods, but also as a freezer for fish or poultry when necessary.



Fig. 9.—Mr. Vincent and his son Peter are here seen behind the refrigerated slab.

ICE BY THE BAGFUL

Twenty-four for Sixpence

Commencing on June 30, customers who visited Whiteley's Food Hall, have been able to purchase bags of ice cubes—24 for 6d. This is an American idea which is popular in the States and Australia, where housewives are used to calling in on their favourite stores, supermarkets, or service stations to buy a bag of ice. This machine, "The Scotsman," has already proved itself a great success. During licensing hours, the wine department are offering a bag of ice with the appropriate bottle of wine, as an extra service to customers without a "fridge." Customers who are taking a longish journey have their ice wrapped in newspaper, in addition to the polythene bag; this helps to keep it from melting.

"The Scotsman" S.C. 100 F automatic ice machine produces



"The Scotsman" S.C. 100 F.

up to 110 lb. or 1,800 crystal clear super-cubes daily and is completely automatic with no complicated chipping or freezing medium. The heavily insulated stainless steel storage compartment holds up to 75 lb. of super-cubes. The cubes are made in a series of moulds or cups that are positioned at the top of the machine. Water is sprayed into the cup until it is full of ice and the cube is then released and falls into the storage bin. This clear, "cube" fits into a glass perfectly and, being round, it displaces 1½ oz. of liquid whereas the ordinary square cube displaces only ¼ oz. of liquid. The average cocktail glass with a Scotsman cube, therefore, appears to contain more liquor. The melting process of this very solid cube is slow and generally most of the ice is left in the glass when the drink is finished. The model S.C.—100F occupies only 5 sq. ft. of floor space and is ideal for under-the-counter or bar installation. There are many and varied Scotsman models and all information regarding these may be obtained from M. L. Winsor & Co. Ltd., 125 Pall Mall, London, S.W.1., the sole U.K. distributors.



J. Beatties Ltd. of Wolverhampton, the large department store, have extended their food department to about 4,500 sq. ft. of sales and display area.

Predominant in the centre of the new extension is a most attractive refrigerated "Carter" island type display and storage cabinet, handling a full range of cooked meats and delicatessen displayed on stainless steel trays. Stainless steel has also been used for the basket rail, front nosing and bumper rails and for the end trims.

This cabinet, with a total frontage of 37 ft. 6 in., was designed for quick and easy service to customers. The display of produce is on trays

at two levels resting on stepped plastic covered wire grids, and is illuminated by colour corrected tubes set behind opaque glass. A shelf, incorporated in the construction of the front glass riser, provides additional unrefrigerated display.

A 16 in. Formica-covered back shelf gives ample space for wrapping and serving, below which provision has been made for cut paper and bags in an angled paper storage compartment.

Refrigerated storage in the base of the cabinets provides facilities for quickly replacing produce sold from the top display. At the end of each return of this cabinet, is a

A new mercury-in-steel, on-off temperature controller, which has independent circuits allowing control at any two points through one instrument, has been produced by the British Rototherm Co. Ltd., Merton Abbey, London, S.W.19. Each of the two controller circuits consists of alloy steel Bourdon tubes, capillaries and temperature sensitive bulbs, operating mercury switches rated up to 30 amps at 230/250 A.C. The differential is fixed but varies according to switching capacity. Indicator lamps and bottom entry electrical conduit are standard. Temperature ranges are available between minus. 20° F. and plus 1,000° F.

(minimum coverage 100° F.) and the equivalent °C. The case is aluminium alloy and the standard capillaries 10 ft. copper sheathed with mild steel bulbs screwed $\frac{1}{2}$ in. B.S.P. This temperature controller is model no. 1039.

* * *

As a result of the acquisition by Blox Services Ltd., one of the companies of Transport Group (Holdings) Ltd., and the well-known haulage and contract hire company, Burn Transit Ltd., the group has continued its declared policy of widening its activities to cover all aspects of the transport and public service fields. Burn Transit Ltd.,

scale and gravity slicer platform. Below this are housed the condensing units, making it a self-contained cabinet.

The whole of the exterior is finished in gleaming white stove enamel on rustless metal. The two swing doors at the back giving access to the serving area, complete this well designed units, constructed by Carter Refrigeration and Air-conditioning Ltd. at their Hay Mills factory in Birmingham.

In addition to this island type cabinet, a further 12 ft. of multi-deck refrigerated display cabinet has also been provided making a total run of 44 ft. of multi-deck display in this department.

with its own subsidiary, Commercial Haulage Ltd., therefore extends the group's interest in commercial vehicle contract hire as already developed by Blox Services Ltd., and gives itself a further interest in general haulage and warehousing. The directors of Burn Transit Ltd. felt that this association would best ensure the continued high standard of service to their customers, and also continuity of employment for their staff. The other interests of the group, which cover refrigerated vehicles, car parking, vehicle distribution and taxicab operation and repair will continue to be developed as opportunity permits.

COMMERCIAL AND INDUSTRIAL SECTION

A most successful exhibition was recently staged by Sarum Refrigeration Service Ltd., in conjunction with their associated company, Sarum Frozen Foods Ltd. The products which the latter company handles—from Ross, Findus, Young, Primecut, Sutton, Seamaid—were



displayed in cabinets provided by Sarum Refrigeration who are main Levin distributors. Some 3,000 retailers had a personal invitation, and a large number of these attended; the public was also welcome. Available at the exhibition were cooled samples of the products which those attending the exhibition could taste; each stand was provided with a demonstrator and cooking facilities. The refrigeration equipment which was exhibited was, in the main, Levin, but this was supplemented by such items as the "Mobar" island site cabinet, Winget "Cool-Tops," and a "domestics" corner with both Bosch and Kelvinator cabinets. The

Manufacturers' and Distributors' News

parent company — Sarum Ice Creamery—was founded in 1926 by Mr. E. Rigiani, and the only activity at that time was the manufacture and sale, both by wholesale and retail, of ice cream. The refrigeration company was a natural follow-on to this, and four years ago the frozen food company came into being. Their latest cold store is equipped with a prototype unit manufactured by L. Sterne & Co., which is a 4-cylinder 15 h.p. semi-hermetic unit, and it was installed by Sarum Refrigeration Service to

Richards (Astral) Ltd., and Morphy-Richards (Installations) Ltd., is opening in Northampton a new service administration centre, depot, and central store. These new headquarters are situated on the Industrial Estate, Weedon Road, Northampton. A service depot for S.E. England will remain at St. Mary Cray. Mr. L. W. Knight, the Morphy-Richards general service manager states: "This new service headquarters is being opened to keep pace with the growing output of the Morphy-Richards Group which in 1960 alone sold 4,000,000 domestic appliances. Northampton has been chosen for the headquarters to provide a strategically-placed group base to co-ordinate the activities of our network of service depots, field service engineers, and the 10,000 accredited service dealers." A new main London service depot for Morphy-Richards has been set up under the management of Mr. Butcher at 29/31 Scrutton Street, Shoreditch, London, E.C.2. (Telephone number Shore-ditch 6941).

* * *

A new catalogue of industrial and domestic fans is soon to be released by Fenton Byrn & Co. Ltd., West Molesey designers of heating and ventilating appliances. Fenton Byrn air impellers are designed for maximum efficiency with minimum noise and in many cases offer the most simple and economical method of ventilating industrial and domestic buildings. Performance ratings of all models are compiled from tests carried out to British Standard Test Method 848/1939. Motors are also built to keep sound levels down, are suitable for continuous running within normal temperature limits and are constructed to British Standard Specification 170. Standard ring mounted propeller fans (non-flameproof) have rubber mountings which prevent metallic contact and thus minimise transmission of electrical noise or vibration. Single phase from the Fenton Byrn heavy duty range (12 in, 15 in, 18 in., 24 in., 30 in. and 36 in. diameters) are fitted with capacitor motors built to B.S.S. 170/39. All are totally en-

serve a 10,000 c.ft. cold store, the unit working in conjunction with Searle-Bush electric defrost-coolers.

* * *

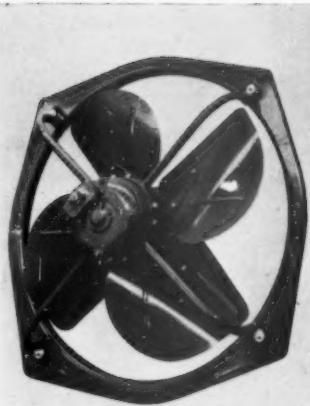
The extensive uses of Polyzote expanded plastics are described in a new booklet "Working with Polyzote." Apart from thermal insulation and packaging, Polyzote is used for buoyancy and moulded lifebuoys, electrical insulation in radar sets, and for various purposes in the building industry.

* * *

On August 8, 1961 the Morphy-Richards service division, which services the products of Morphy-Richards (Cray) Ltd., Morphy-

COMMERCIAL AND INDUSTRIAL

closed with ball bearings. Maintenance is facilitated by external lubricators. Impellers, designed for maximum efficiency in terms of air displacement for power consumption, are heavy gauge pressed metal blades bolted to a substantially cast centre boss. The motor is secured to resilient mountings, and the ring itself is of pressed steel formed to give rigid fixing. Fans will operate satisfactorily at temperatures between 25° F. and 110° F. Fans in the light duty class, although constructed to the high standards of the heavy duty range, are intended for use in relatively clean and dust free air. Motors are of the shaded pole type for single phase voltages only and the impellers are formed from a single pressing. Larger models in the light duty group can, however, cope with moderate resistances and operate satisfactorily as alternatives when conditions are suitable. Sleeve bearing motors on these fans are "oiled for life"—need no additional lubrication. For automatic fan control according to



temperature, a stem type thermostat of the three contact pattern can be wired to close the circuit on a drop in temperature, or for the reverse action. In view of their low differential, these items are ideal for the accurate control necessary in agriculture. Protective wire guards are available for both blades and

motor sides of all Fenton Byrn propeller fans. Guards are secured by means of special quick-release spring clips which obviate disturbing fixing screws for routine cleaning operations.

* * *

Mr. Allan B. M. Simpson and Mr. Norman H. Leach have been appointed directors of **Marco Refrigerators Ltd.**

* * *

Mr. Peter Thomas has joined **Electrolux Ltd.** as editor of the *Electrolux Magazine*, which the company publishes for circulation to its dealers, and the *Electrolux News*, the company's staff journal. In addition to his magazine work, he will assist the P.R.O., Peter Boyd-Cox, with public relations activities. Mr. Thomas worked with the weekly press and as a free-lance in Sydney prior to his arrival in Britain early in 1959. His first contact with British journalism was as a reporter with the Leicester News Service and features writer for the *Leicester Graphic*. He later edited this magazine and the *Birmingham Sketch*—both provincial glossies of the Trade & Industrial Press group.

COMPETITIVE NEW MODELS from MARCO'S

At a press conference held at the Grosvenor Hotel, London, to introduce new products, **Marco Refrigerators Ltd.**'s directors—Mr. E. G. Batt, chairman, Mr. R. J. Simpson, managing director, Mr. E. A. Leach, secretary, Mr. A. B. M. Simpson and Mr. N. H. Leach—were present.

The managing director said : "We have the privilege of being one of the oldest British companies engaged in the refrigeration business. Our activities started almost literally, under the railway arches, in the middle of the last century. The first records of the company show that in those days our predecessors were making ice cooled refrigerators generally as regular standard production.

"Early in the present century, the company's predecessors, F. R. Martin & Co., from which the trade name "Marco" originated, and the present company, supplied some of the very earliest semi-automatic machines built in England, as combined compression and condensing units located on a common base.

"This production has progressed down the years, and today you can see here some of our latest products. We manufacture a wide variety of standard models for medium and low temperature applications. We also carry out insulation work, cold rooms, special cases, and of course we manufacture our own range of the famous "Marco" "Serviseal" semi-hermetic condensing units.

"Today we are showing three examples of some of our recently introduced cabinets, for the frozen food range, i.e., Florida, Californian display cases, and the New Yorker dual temperature display case. Both the Florida and Californian were introduced during the latter part of 1960, and have established themselves successfully.

"The New Yorker is a new model introduced as from July 1. This combines a low temperature frozen food display and storage section, with two upper shelves for the display of medium temperature goods. This model has been de-

veloped from the Californian, and we believe that the market trend will show a demand for more vertical display in refrigeration products, and the layout of this display case has been designed especially for small food shops. As you can see in this one case, it is possible to display frozen foods and cooked meats and other products requiring medium temperature conditions.

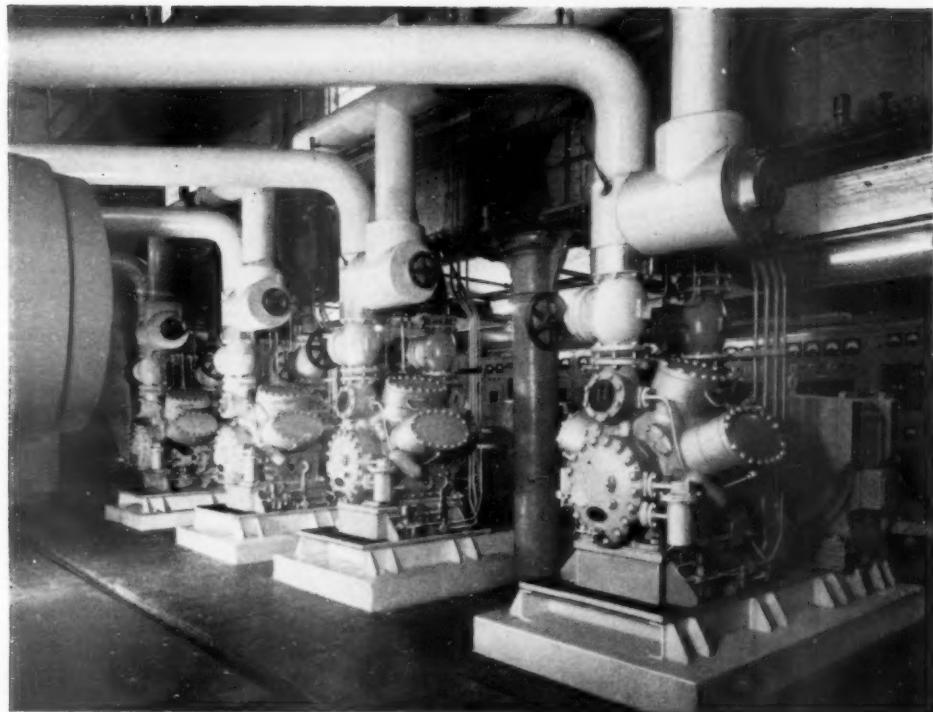
"In addition to these three frozen food models, we make a variety of models of smaller and larger capacity.

"Turning to medium temperature applications, we have on show here today, two cabinets, one the Berkeley service cabinet which is all steel construction with porcelain enamel interior liner. This is one of a range of service cabinets from 13 to 60 c. ft. which we manufacture. This cabinet is an example of the type of cabinet which we are currently supplying to the Admiralty, War Office, Air Ministry, county councils, and hospital groups. As you know for the Armed Forces requirements, these cabinets have to comply to a very rigid specification and capable of operating in extreme temperature and humidity conditions.

"The second cabinet, the Croydon counter top, is an example of the

REFRIGERATION

for
manufacturing
processes



J & E HALL LTD

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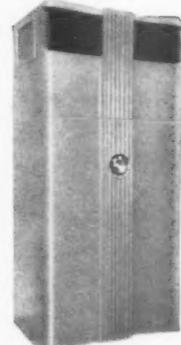
In brewing, for example, it plays a controlling part in all the processes. The illustration shows the four, 8-cylinder, 5" x 4" veebloc compressors, using ammonia as a refrigerant, supplied to Mann, Crossman & Paulin Ltd., Albion Brewery, London, E.C.1.

J. & E. Hall have supplied refrigerating equipment to all the leading manufacturers in the Brewing Industry.

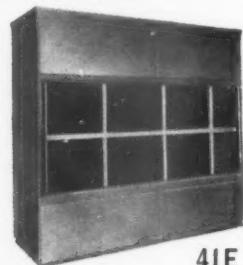
AP 375

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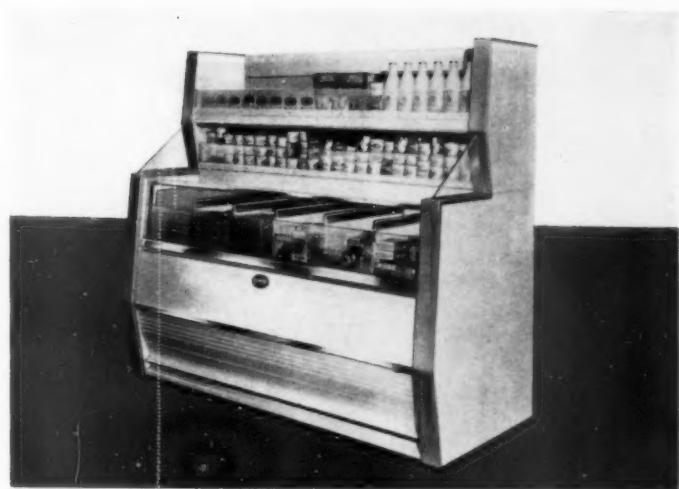
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a very difficult period in the refrigeration industry, and it is my feeling that whilst we welcome competition from overseas, a lot more might be done both by the British manufacturers, and our trade press here to make known what is being done by the British manufacturer. Our prices are competitive; no one can maintain a place in the market otherwise. The quality of British products is better than ever, and in my mind we offer better value per £., for our products than can be stated for some of the imported commercial cabinets I have seen during the past two years.

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THE MOTOR STERN VESSEL "LORD NELSON"

Britain's First Part-Freezer Trawler

By Commander M. B. F. RANKEN
M.I.Mar.E., A.M.R.I.N.A., M.Inst.R., Member A.S.H.R.A.E.*

DESPISE the curtailment of supplies of fish on the middle and distant-water fishing grounds due to more intensive fishing especially by the U.S.S.R. and Poland, and to the widening of territorial limits around Iceland, the Faroe Islands and Norway, the great majority of the fish landed in Great Britain at the present date is still wet fish. The only frozen fish landed comes from the three stern factory trawlers *Fairtry I, II, and III* (Chr. Salvesen & Co., Leith), the converted drifter trawler *Autumn Sun* (H. S. Fishing Co Ltd., Yarmouth), and the diesel-electric research side trawler *Sir William Hardy* (Torry Research Station, Aberdeen); all other frozen fish is imported or frozen ashore.

To produce a product comparable with really fresh fish it is necessary to freeze white fish within two or three days of catching, and herring within 24 hours. In both cases a storage temperature of -20 F. (-29 C.) is recommended and this low temperature is essential for herring and other similar fish even for quite short periods in storage.

It will be obvious that if the United Kingdom is to maintain, and if possible, increase her consumption of fish, her fishing vessels must go much farther afield for their supplies and if the required standards of quality are to be obtained this inevitably means that the fish must be frozen on the fishing grounds. The factory trawlers were introduced for this purpose, but they each cost at least three times as much as a conventional distant-water trawler although their productivity when operating alone is said to be only twice as great in spite of the much greater time spent on the fishing grounds; this productivity may be increased by operating one or more normal trawlers in company with a factory trawler or other ship, as has been done experimentally by the *Ross Hunter* (Ross Trawlers Ltd., Grimsby) with the *Fairtry II* but there is then a formidable problem in transferring fish at sea without excessive deterioration or damage of the fish.

An alternative put forward by the Torry Research Station, Aberdeen, is the part-freezer trawler which is designed to obtain some of the benefits of freezing white fish at sea without greatly increasing the size or cost of the ships or altering radically any of the steps in the chain of production, catching, landing,

The £450,000 "Lord Nelson," Britain's largest fishing trawler and the latest to be built for the Associated Fisheries fleet, arrived at St. Andrew's Dock, Hull, at the end of June following trials in the North Sea. The history of freezing at sea is here traced.

marketing and distribution. In the original conception such a vessel would freeze whole approximately the first one-third of her catch, but recent events suggest that the proportion of frozen fish should be increased and it is likely that new ships will freeze virtually the whole of their catches. Following experiments on a laboratory scale both ashore and afloat a commercial design of vertical plate-freezer (the Torry-Hall) was developed and eight of these were installed in the distant-water steam side trawler *Northern Wave* (Northern Trawlers Ltd., Hull) for full-scale trial voyages in 1956. Further similar experiments have been carried out in the trawlers *Marbella* and *Junella* (J. Marr & Sons Ltd., Hull). The first trawler to be equipped with a vertical plate-freezer installation on a commercial scale is the motor stern trawler *Lord Nelson* (Lord Line Ltd., Hull) recently completed by Rickmers Werft, Bremerhaven. Her main particulars are given in table I.

In the original conception of Torry Research Station a properly designed part-freezer trawler of 185 ft. b.p. commanded by an average skipper could expect to increase her time on the fishing grounds by 50 per cent. and as a result, to have a productivity of 1.31 times that of a conventional vessel (7). This could be done with a considerably lower main engine horsepower, size and hence fuel consumption, which would more than offset the capital and running costs of the freezing installation. It is clear, therefore, that even in the conditions now existing adoption of part-freezer trawlers is a logical solution of the present dilemma. The argument is all the stronger when the advantages of improved quality, greatly reduced wastage, and more uniform supplies are taken into account.

In the *Lord Nelson* the engine size has not been reduced compared with a conventional wet fish distant-water trawler, due partly to the availability of the engine prior to the vessel being ordered, but also to the owners' wish to compete with existing vessels as far as wet fish is concerned. The frozen fish hold now has almost half the total storage capacity and nearly 1.7 times that of the forward wet fish hold. Provision has been made to allow the intermediate bulkhead to be removed at a later date if desired, so enabling the frozen fish hold to incorporate the present forward wet fish hold. In the original design a fishmeal plant was to have been

* J. & E. Hall Ltd., Dartford.

installed aft, but following the collapse in world fish-meal prices due to over-production in Peru, this plant was cancelled and the space made vacant was converted into a wet fish hold to be used alternatively for buffer storage before freezing at times of glut catches or when required for the last few day's catch of wet fish. An inclined elevator is provided to raise the fish from this store to the rotary washer through which all fish passes before being placed in the freezers or stowed in the wet fish hold.

Capacity of Freezing Plant

Torry Research Station's original ideas for a part-freezer trawler were based on the use of a conventional distant-water side trawler preferably with diesel-electric propulsion of the minimum horsepower required. The average round trip of these trawlers in 1956 was 2,400 miles and took 20 days, including the day of departure and the day of discharging the fish; nine days were spent fishing. The average catch of white fish landed was 1,850 kits (1 kit = 140 lb. = 64 Kg.) per trip for 15.2 trips in the year (7).

Allowing for about 5 per cent. loss in weight during storage in ice this meant that the average catching rate was 216 kits per day although as high as 400 kits per day or even more were caught on occasions. It was shown in the *Northern Wave* report and a later paper that in conjunction with the optimum size of frozen fish hold and taking into account the removal of the heads and the buffer storage of the fish in ice for up to three days before freezing, a plant with a freezing capacity of 150 kits/day (9.4 tons/day) could deal with catching rates of 400 kits/day (25 tons/day) or more of whole fish for at least three days in succession. (7, 11). However, in the *Lord Nelson* there was originally no provision for buffer storage of the fish before freezing and the owners were anxious to be able to fish grounds which might well be much more productive than the traditional grounds currently being fished for white fish. In consequence it was first decided to fit a plant with an output of 300 kits/day (19 tons/day) and this was later increased to 400 kits/day (25 tons/day) actual frozen weight of gutted, headless cod.

The Torry-Hall Vertical Plate-Freezer

As previously mentioned, the Torry-Hall six-station vertical plate-freezer was developed for freezing gutted, headless cod and in the version fitted in the *Lord Nelson* a block size weighing 90 lb. (41 Kg.) was chosen as being the largest which could easily be handled in the frozen fish hold while at the same time preserving a convenient size of pound. The unit has six stations in two groups of three, each formed by four special multi-channel extruded aluminium double-sided plates suspended vertically from their top edges on patent gas-tight trunnion connexions; these plates provide contact of the evaporating refrigerant over nearly the whole surface area of the plates, thereby enabling a shorter freezing cycle time to be used than was possible in the original design fitted in the *Northern Wave*. These connexions enable the plates to be hinged

about the centre line of the trunnions and they can therefore move apart at the bottom to release the frozen fish blocks formed between them. Refrigerant at -40°F . (-40°C .) flows through the channels formed in the plates from the inlet to the outlet trunnion connexions for about $3\frac{1}{2}$ hours. Each group of four plates is fed in parallel from manifolds into which the trunnions are inserted. The rectangular slots between the plates form the moulds or stations in which the fish blocks are frozen, and the bottoms of the stations are closed during the freezing cycle by bottom doors hinged into a horizontal position, one door for each group of three stations. Mechanical linkages between the bottom doors and the freezer plates secure the latter in their closed (parallel) position during the freezing cycle. At the end of the freezing cycle, by which time the centre of the block should be below -50°F . (-21°C .), hot gas is passed through the freezer plates for two to three minutes to release them from the blocks; at the same time the bottom doors are dropped into their open (vertical) position. This, through the linkages, moves the plates apart to release the blocks. The frozen fish blocks drop out on to nets in the frozen fish hold, from which they are then removed for stowing. Finally the levers are returned to their original positions and the freezer is again ready for filling.

With the sixteen freezers fitted there are 32 independent sections of 3 stations and based on a total cycle time of $3\frac{1}{2}$ hours, including the time required for filling, one section should be loaded every seven minutes; however, it is more likely that the fishermen will in practice load in groups of two or three sections at longer intervals.

Defrosting being inherent in the method of release of the frozen blocks continuous operation can be maintained indefinitely.

No provision is made in the *Lord Nelson* for glazing the fish after freezing for the following reasons:

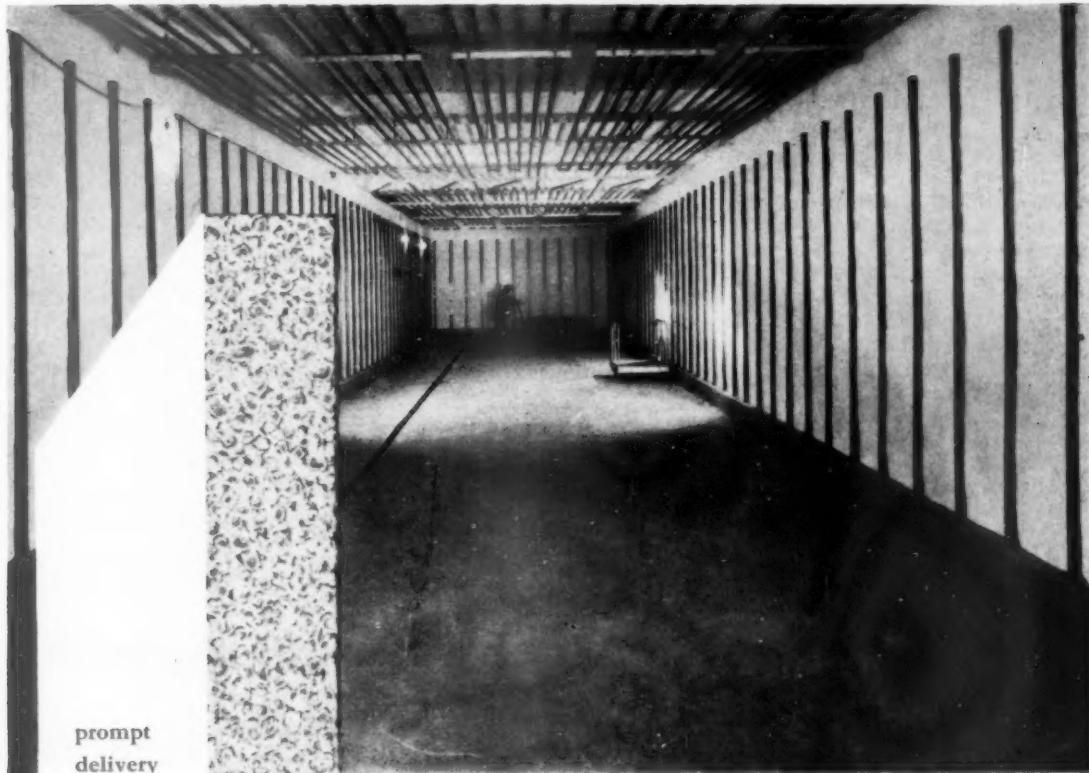
- (a) The grids and insulation in the frozen fish hold are arranged to reduce desiccation to a minimum and this is further assisted by the fact that the vapour pressures of moisture in air are extremely small at these low temperatures and do not produce excessive sublimation of ice or movement of moisture in the store in conjunction with the large surface area of the grids.
- (b) The length of time in the store is usually relatively short (not more than say 35 days) and is not sufficient to cause appreciable damage before the blocks are taken ashore at the end of the voyage.

Frozen Fish Hold

The size of the frozen fish hold is sufficient to store approximately 2,350 kits (145 tons) actual frozen weight of gutted headless whole fish at -20°F . (-29°C .) while the wet fish holds can accommodate about 2,700 kits (170 tons) of fish packed in ice at as near 32°F . (0°C .) as possible or say 1,620 kits (100 tons) of fish in ice forward and 480 kits (30 tons) of shelfed fish in single layers in the after hold in the

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manner usual for the last caught fish in British trawlers.

Very good cork insulation has been fitted in the frozen fish hold to a thickness varying from 11 in. (285 mm.) on the bulkheads to 6 in. (155 mm.) round the elevator trunk, with 8 in. (200 mm.) over beams and frames and 10 in. (250 mm.) on the tank top and outboard of the freezers; in addition, the space left between the frames and beams and elsewhere by the cork have been filled with glass wool. The deckhead and certain other parts of the forward wet fish hold have also been heavily insulated to reduce the work involved later should this hold be converted into a part of the frozen fish hold. As far as possible no brackets or other supports pierce the insulation, the whole of the internal structure being braced internally and supported by the minimum number of pedestals of low heat transmission penetrating the insulation envelope.

Cork insulation was chosen as no fully developed alternative was available at the time of ordering the vessel, but it seems likely that, except for the tank top which must carry the weight of the cargo, polyurethane foam would be used as the insulant in future vessels of this type and this material has, in fact, been used for the lightweight loading doors and hatch plugs in the *Lord Nelson* in conjunction with moulded glass-fibre frames.

The cooling grids are situated in an air space close to the ship's sides, bulkheads and deckhead and another air space has been left above the floor insulation to allow free convection over all insulated surfaces.

As previously described, the fish blocks drop into nets in the frozen fish hold after freezing, from which they are taken by hand for stowage until the end of the voyage. A paternoster type elevator has been provided by which the frozen fish blocks are raised from the frozen fish hold and discharged on to the upper deck just forward of the wheelhouse. From here they can be taken by hand or by conveyor to the dock side.

Refrigeration Plant

It is important for the plant in this type of vessel to be as simple, reliable and robust as possible; it must also be compact and if possible fully automatic in operation. In the design for the *Lord Nelson* these requirements have been borne in mind, and it has been the aim to produce a plant which requires almost no adjustment and no maintenance or repair whatever while the ship is at sea.

Theoretically, ammonia would have been the ideal refrigerant for this duty had it not been for its toxic, explosive and corrosive properties, which make it undesirable in any, and especially in so small a ship. Refrigerant 22 would normally be the right alternative choice but for the type of circuit it was desired to use this refrigerant is unsatisfactory on account of certain lubrication difficulties at the low evaporating temperature required (-40°F ; -40°C); refrigerant 22 is also expensive. Refrigerant 12 was therefore chosen, although it requires large compressors for the same refrigerating capacity.

At the time the vessel was ordered it was considered that for simplicity a single-stage system would be preferable to a two-stage, but current thought suggests that a compound plant is preferable on grounds of efficiency and cost and it need not be too complicated.

Although, therefore, a two-stage refrigerant 12 plant would probably be chosen to-day, the plant in the *Lord Nelson* is single-stage and incorporates a forced-circulation flooded direct expansion system using special magnetic-coupling, glandless centrifugal refrigerant pumps and pilot controlled solenoid-operated low temperature pulse regulators, both units incorporating patented features. This method of control is preferred to a float as it is virtually unaffected by the violent motion experienced in a trawler. Simple direct expansion has been tried experimentally at Torry Research Station and on board the *Sir William Hardy* but the freezing rates obtained were very much slower than with forced circulation and the circuit was more complicated.

An important feature of the plate freezers is the use of hot gas to release the blocks and ensure that the plate surfaces are free of ice before refilling. This hot gas is obtained from the compressors' discharge which is artificially kept some 15°F . (8.5°C) above the condenser gauge by a special discharge pressure modulating valve, so as to ensure rapid flow through the freezer plates as well as a good temperature difference to provide quick defrosting; in the latest arrangement defrosting is expected to take under three minutes per 3-station section. Special defrost cocks are fitted to change-over from the freezing to the defrost cycles; these also have an "off" position which enables any half freezer to be isolated if required.

The frozen fish hold grids are also circulated with liquid refrigerant by pump circulation and provision is made for precooling the wet fish room and preserving the ice on the outward voyage by the same means; the ice is used alone on the homeward voyage, as recommended by Torry Research Station. Refrigerant to the grids and to the freezers is circulated from a suction storage and separator vessel situated in an insulated recess in the after bulkhead of the frozen fish hold directly below one corner of the refrigerating machinery room; this layout simplifies the pipe leads between the insulating space and the refrigerating machinery room. The circulating pumps are directly below the vessel in the recess with their driving motors in the main engine room; special couplings and water-tight glands are fitted in the driving shafts.

Some people might be unwilling to use a direct-expansion system for this type of application in view of the large refrigerant change, but the only alternative is some such undesirable secondary refrigerant as trichlorethylene (C_2HCl_3) which, in the event of a leak, would be liable to asphyxiate men working in the frozen fish hold; it also has poor heat transfer characteristics and requires considerable pump power to circulate it as well as being expensive and possibly more difficult to contain than refrigerant 12 (CCl_2F_2). A secondary refrigerant system is more complicated

and requires lower evaporating temperatures and hence larger compressors; the freezing and also defrosting rates are both retarded considerably. In the system chosen, every possible joint has been welded and great care has been taken over the siting and number of the remainder, so that maintenance is eased and leaks can be found and stopped promptly. At the temperature of operation (-40°F ; -40°C), the low side is under a vacuum and hence the tendency is for air to leak in, but this is not expected to be a serious problem and no purger has been provided.

It is true that the refrigerant charge is large enough to fill the frozen fish hold to a height in excess of 6 ft. in the event of a serious leak, but this is unlikely to happen under normal conditions, although it may be desirable to take precautions after a long shutdown.

The magnetic pulse regulators and the suction vessel level indicator are electronically controlled and small alternating current rotary-converters are fitted in the main control panel to provide power. There are in addition high, low and differential oil pressure cut-outs, numerous alarms and indicator lamps, automatic capacity control on the two large compressors, safety bursting discs, a heat exchanger and numerous other fittings.

The larger compressors are of the modern V-W type with 8 cylinders each of 7 in. (178 mm.) bore and $5\frac{1}{2}$ in. (140 mm.) stroke. The machines run at 750 r.p.m. and in addition to automatic capacity reduction, delivery oil separators, an oil rectifier and an oil receiver are fitted. On account of the expected heavy rolling of the ship, the two larger compressors have dry sumps and separate oil tanks are fitted, from which special vane-type oil pumps draw the oil required for the forced-lubrication and suction-valve lifting systems.

The smaller compressor has 6 cylinders of $3\frac{3}{4}$ in. (95 mm.) bore and 3 in. (76 mm.) stroke and runs at 1,500 r.p.m. This machine is normally run only after freezing is finished to maintain the frozen fish hold temperature during the homeward voyage. The machine could readily be converted for two-stage operation to provide the larger output needed if the frozen fish hold is later extended to include the present forward wet fish room; in that case a larger motor might also be required.

The condensers are of the conventional shell and tube marine type with steel shells, nickel cast iron end covers and aluminium brass tubes rolled into the mild steel tube plates, the latter clad on the water side with stainless steel. The small condenser is for the holding compressor only, while the larger one serves the two larger compressors together and the smaller one in emergency.

A full set of alarms and controls is fitted in the refrigerating machinery room which is situated in the 'tweendeck on the port side in way of the main engine casing. A ladder gives access to the main engine room and a door to the alleyway. Bells are provided to give warning of any serious defect in the plant's operation. All motor starters are automatic and the aim has been to enable the plant to be started

by pressing one button just before leaving port and another on the completion of discharging the frozen fish at the end of the voyage. In between, everything should happen automatically, except that the small compressor may be shut off manually if desired while freezing is in progress and similarly the larger compressors may be switched off while holding.

Conclusions

This vessel is an alternative to the costly fish factory ship. It is intended to deal only with whole wet fish, which after landing can, if desired, be thawed and treated exactly like fresh fish when the market demands it. This eliminates the costly processing machinery and large crew which are the main reasons for the size and cost of the factory trawler. There is little doubt that the cost of future vessels could be reduced much below that of the *Lord Nelson* and in spite of her cost she is undoubtedly the commercial prototype, or, at any rate, pioneer of the freezer as opposed to the factory trawler.

As distances increase, the proportion of fish frozen will also have to be increased and later projected designs are already contemplating this next step of freezing the whole catch, which results in a less complicated design, as well as in the possibility of using really economical main engines, as there is then no point in returning home at more than 10 to 12 knots. Some of these later designs are also suitable for operation in warmer waters such as off North-West Africa and in the South Atlantic.

It seems likely, and it is to be hoped, that the recent publication of the "Report of the Committee of Inquiry into the Fishing Industry," coupled with the commissioning of the *Lord Nelson*, will lead to the more rapid adoption of freezing at sea by the British and other fishing industries. It is also to be hoped that the industry and public will soon reap the full benefits of this major change in practice, by the adoption of appropriate methods of sale and distribution of frozen fish. The methods used for wet fish are not the right ones for frozen fish. Ideally, the frozen fish should remain at a holding temperature of -20°F . (-29°C .) until it is ready to be butchered on the fishmonger's slab, or to be prepared for smoking. However, in the conditions in the United Kingdom no appreciable loss of quality is involved if fish is thawed at the port and distributed as normal fresh fish. It should then be possible to sell it at better prices than wet fish as it will unquestionably be of better quality than all except the best of the near-water landings. Above all, fish frozen at sea should be distinguished from that frozen on shore or sold "fresh"; it should then command a higher price to pay for the extra care taken in its production.

Lord Nelson is a worthy name for any ship and especially a pioneer of a new era in fishing methods.

TABLE I
PRINCIPAL PARTICULARS OF THE MOTOR STERN TRAWLER
Lord Nelson

Length overall ...	239 ft.	(72.8 m.)
Length b.p. ...	211 "	(64.2 m.)
Breadth (moulded) ...	36 "	(11.0 m.)
Depth (to upper deck)	23 "	(7.1 m.)
Draught ...	14 "	(4.35 m.)



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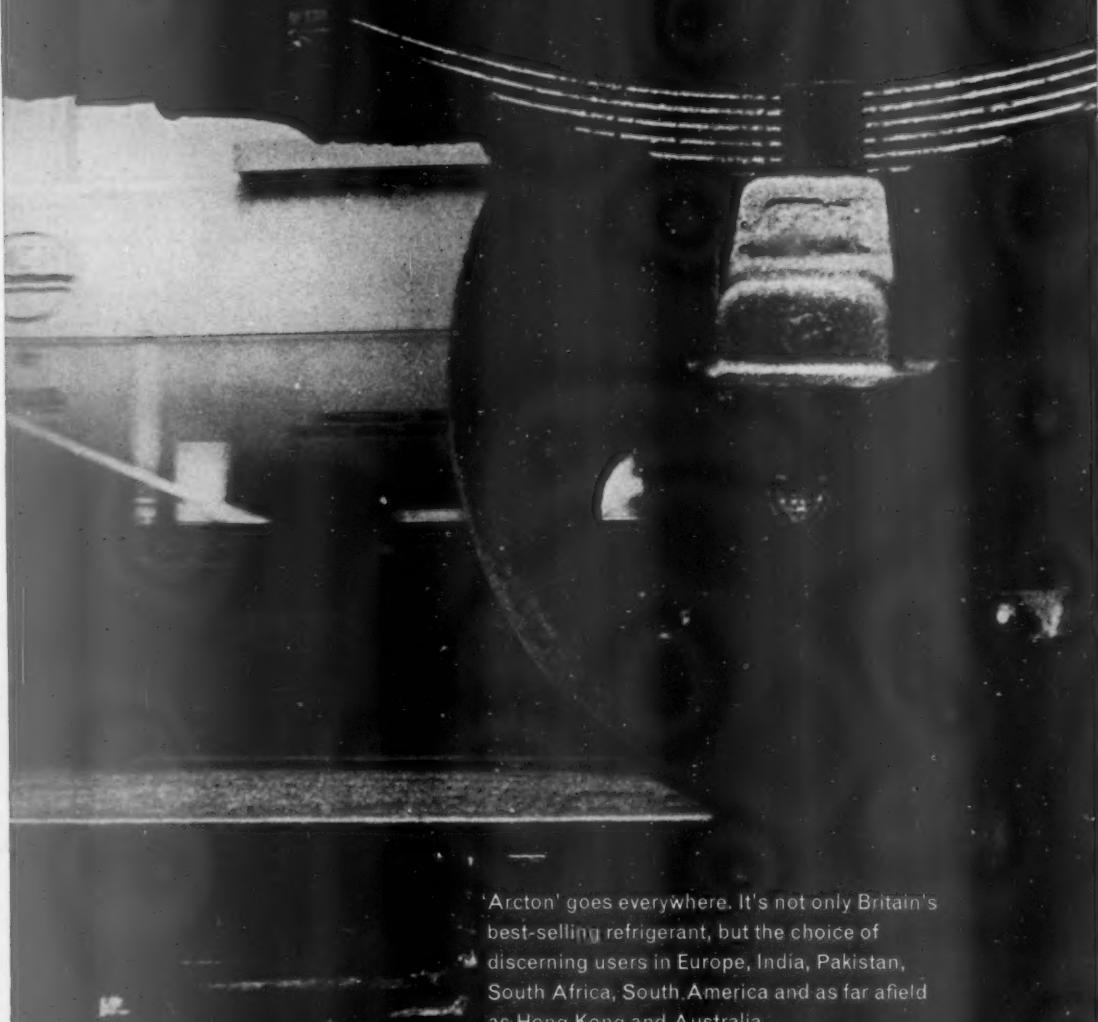
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Literature and information are available on request.

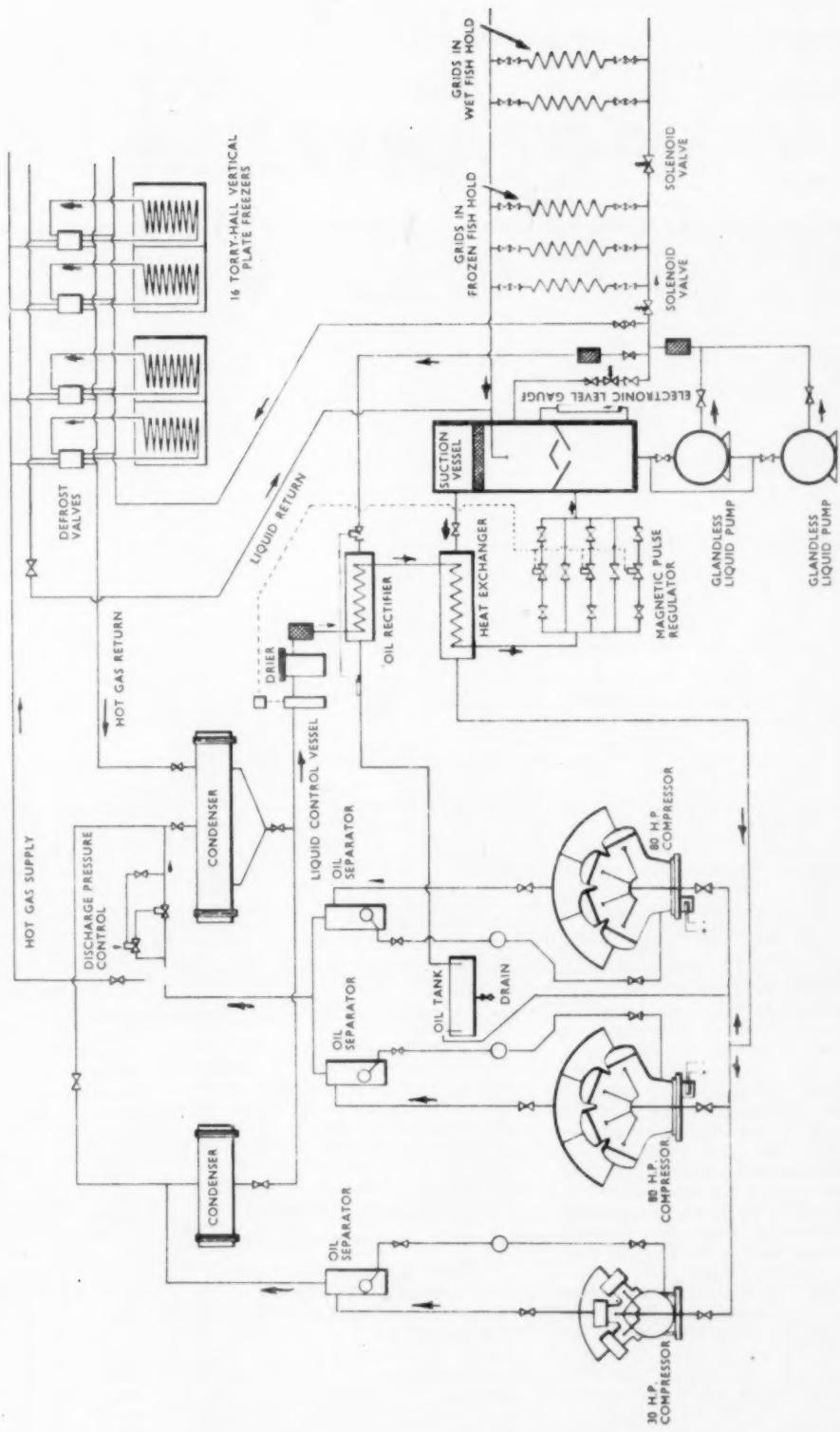


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AH 5 K

DIAGRAMMATIC LAYOUT OF FREEZING SYSTEM



Main engines Mirrlees Monarch 1,800 b.h.p./225 r.p.m.
Crew 32 (35 berths)
Fish hold capacities ...	Frozen—11,620 ft. ² (329.1m ²) Forward wet— 7,080 ft. ² (200.6m ²) After wet— 48,000 ft. ² (135.9m ²)
Trawl winch ...	Charles D. Holmes & 350 b.h.p. Company Ltd., Hull.
Refrigeration plant :	J. & E. Hall Ltd., Dartford.
Freezing capacity...	25 tons/day actual frozen weight.
Block Size...	42 in. x 2 in. x 4 in. thick weighing 90 lb. (1,070 x 535 x 102 mm. weighing 41 Kg.)
Compressors ...	Two 7 in. x 5½ in. (178 x 140 mm.) 8 cylinders 750 r.p.m. 80 b.h.p. One 3½ in. x 3 in. (95 mm. x 76mm.) 6 cylinders 1,500 r.p.m. 30 b.h.p.
Refrigerant ...	Refrigerant 12 (CCl ₂ F ₂)
System ...	Direct expansion pump circulation
Storage temperatures	Frozen fish hold -20°F. (-29°C.) Wet fish hold 32°F. (0°C.)
Insulation ...	Cork
Hold cooling system ...	Pipe grids (not after wet fish hold).
Frozen fish elevator	Mechanical Automation Ltd., Rochester, Kent.

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- ⁸ BANKS, A., & EDDIE, G. C. The Freezing of Fish for Industrial Purposes.
- ⁹ RANKEN, Cdr. M. B. F. (1958). Some Modern Developments in Fish Freezing and Storage Equipment for Ships. Papers read to a Joint Meeting of Commissions 3, 4 and 5 of the International Institute of Refrigeration, Moscow, September.
- ¹⁰ EDDIE, G. C., HALES, R. T., & HIGHAM, D. W. (1957). The Development of a Quick-Freezing Plant for Deep Sea Trawlers. Paper read to Institute of Refrigeration, December.
- ¹¹ WHITE FISH AUTHORITY. (1957). Report on an Experiment into the Freezing of Fish at Sea. H.M.S.O., London.
- ¹² EDDIE, G. C. (1957). Recent Developments in Propulsion Machinery and Freezing Equipment for Deep Sea Trawlers. Paper read to Scottish Branch of Institution of Mechanical Engineers, November.
- ¹³ HURD, R. (1957). Polyurethane Rigid Foams. I.I.F. Bulletin, June.
- ¹⁴ CUTTING, C. L. *et alia*. (1955). The Care of Trawler Fish. Leaflet No. 3—Torry Research Station D.S.I.R. (Food Investigation).
- ¹⁵ REAY, G. A. *et alia*. (1950). The Freezing and Cold Storage of Fish. Leaflet No. 11—Torry Research Station, D.S.I.R. (Food Investigation).

AIR-CONDITIONING SUBJECT OF B.H.A. MEETING

At a meeting of the British Hairdressers Academy held last month, at the Kingsley Hotel, London, Mr. E. P. Johnson, dealer sales manager, Carlyle Air-Conditioning and Refrigeration Ltd., was the guest speaker. As this was the first meeting of its type held by the academy, considerable interest was aroused in the functions of the air-conditioning system. This was simplified by a short film designed for a non-technical audience. Many members of the audience confessed that this was completely new to them, as they had previously associated air-conditioning either with plain cooling or some type of fan arrangement.

The main problems encountered in hairdressing salons, Mr. Johnson explained, were in the form of heat gains derived from hair dryers, elaborate lighting schemes, solar radiation and body heat. He stressed that this was most noticeable when considering the level of humidity. For example, hair dryers transferred large quantities of water vapour from moist hair to the salon atmosphere and if comfort is to be main-

tained continuously this humidity must be mechanically controlled.

Answering a question on odour removal, he explained that an air conditioning unit, besides introducing outside air into the conditioned space to flush away odour concentrations, also reduces odours through temperature and humidity reduction.

In conclusion, Mr. Johnson said that in this country, air-conditioning can provide satisfactory improvements to business and staff problems, and it should be remembered that it was not necessary to lower the temperature from, say, 80° to 60°F. to create the impression of comfort. A temperature difference of as little as 6°F. would be most noticeable to the customer when entering the salon.

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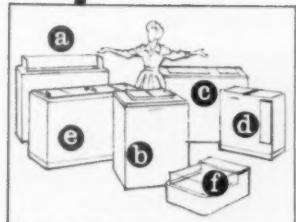
they are designed to operate on oil at a working pressure of 2,000 p.s.i. and there are seven standard bore sizes available, the largest having a thrust of 40 tons. Both single or double acting versions are manufactured with strokes ranging from ½ in. to 10 ft.

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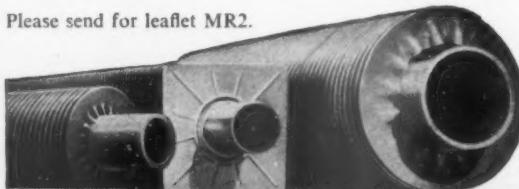
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PATENTS

APPLICATIONS RECEIVED

April 19—Petrucci, O., C14105, Hermetic seal for refrigerator compressors; General Motors Corporation, C14128, Refrigerator cabinets. 27—Frigeo, S.A., C15289, Trays for refrigerators; Kelvinator Ltd. Triggs, E. A., P15281, Refrigerators. May 1—Licentia Patent-Verwaltungs-G.m.b.H. Jentsch, C., C15687, Ice-making devices; Stone & Co. (Deptford) Ltd., J. Leigh, B. R., and Thomas, L. G., P15717, Thermostats. 4—Dosogne, L. G. J. G., P16141, Frozen food cutting apparatus. 5—Stal Refrigeration, A. B., Larsson, N. E. B., C16386, Refrigeration compressors. 6—De Havilland Aircraft Co. Ltd., Gurney, J. D., and Simmonds, N. H., P16534, Compression refrigeration system. 9—Helsingborgs Fryshus, A. B., C16902, Freezing plant for bulk products; Ross, A. J., C16870, Apparatus for freezing liquids; "Shell" Research Ltd., Heckmatt, H. H., P16830, Refrigeration systems. 10—Pressed Steel Co. Ltd., Overton, A. G., C16966, Refrigerators of vapour-compression type. 11—Daimler-Benz, A.G., C17245, Vehicle ventilation and air-conditioning installations; English Electric Co., Ltd., Popple L. A., P17225, Thermoelectric devices, etc. 16—Daimler-Benz, A. G., C17815, Ventilation and air-conditioning of vehicles. 19—English Electric Co. Ltd., Thompson, J. E., P18289, Methods of manufacturing thermoelectric units. 23—Bass Ltd., J., and Granger, E. J., P18561, Air-conditioning apparatus. 26—Philips' Gloeilampenfabrieken, N. V., C19095, Refrigerators and heat pumps. 29—Philips' Gloeilampenfabrieken, N. V., C19296, Multi-stage refrigeration. 31—Pressed Steel Co. Ltd., Overton, A. G., P19622, Refrigerated vending machines. June 3—Byng, R. C., Strafford, Earl of, P20074, Refrigerators etc. apparatus. 5—American Radiator & Standard Sanitary Corporation, C20182, Cooling means for refrigerant compressor motors; Beckmann, H., C20214, Method and device for freezing of foods, etc. 8—General Motors Corporation, C20736, Refrigerators; Heat Pump & Refrigeration Ltd. Komeda, M., and Simpson, A. R., P20821, Ice making apparatus. 12—Atlas A/S, C21074, Accelerated freeze drying. 13—Luca, C. de, C21226, Freezing cabinets for household etc. use.

COMPLETE SPECIFICATIONS ACCEPTED

May 10—Minikay Ltd., 871,718, Thermal insulation of insulated vehicles. 17—General Electric Co. Ltd., 872,203, Apparatus for automatically controlling temperature; Pressed Steel Co. Ltd., 871,841, Cabinets, particularly refrigerator cabinets; Alfa Romeo S.p.a., 871,877, Arrangement for conditioning air inside a chamber such as a motor-car under open circuit conditions. 25—Trepaud, G., 872,482, Freezing apparatus. 31—General Motors Corporation, 873,333, Freezer tray-grid assembly. June 7—Dairy Supply Co., Ltd., 873,744, Insulated tank. 14—Wilbuszewich, E., 874,277, Method of cooling goods packed in containers; Vilter Manufacturing Co., 874,295, Flake ice-making machine. 21—General Electric Co., Ltd., 874,660, Thermoelectric devices. 28—Garrett Corporation, 875,318, Compressors for refrigerating plants; Culk, R., 875,282, Refrigeration compressor. July 5—General Electric Co., Ltd., 875,478, Thermoelectric cooling devices; Liquefreeze Co., Inc., 875,752, Refrigerating and gas-liquefying plant and method.

New Companies

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

Edward Blackoe & Sons Ltd., Sandock House, Dimson, Gunnislake. Secretary: Edna M. Blackoe. To carry on business of refrigeration engineers, etc. Nominal capital:

£100. Directors: Edward Blackoe and Edna M. Blackoe, Sandock House, Dimson, Gunnislake. (perm). Solicitors: Bond, Pearce & Co., Plymouth.

Osborne Refrigeration & Engineering Ltd. Nominal capital: £2,000. Secretary: M. J. Etheridge. Directors: Jeffrey Osborne, 18 Central Drive, Bognor Regis; Michael J. Etheridge, "Tanglewood," Outerwyke Road, Bognor Regis.

Link Refrigeration Co. Ltd., 197-201, Albion Street, Grimsby. Secretary: Leonard Finn. Nominal capital: £1,000. Director: Dennis W. Leggott & Mrs. Nancy Leggott, 50 Bargate, Grimsby, Lincs.

Overend Electrics Ltd., 5, Albemarle Street, W.1. To carry on business of manufacturers of and dealers in dynamos, refrigerators, cookers, etc. Nominal capital: £1,000. Directors: John M. Overend, 45, Nicholas Way, Northwood; Ronald L. M. Overend, Turf Lodge, Wolsey Road, Northwood. Registered by Solicitors: Hextall, Erskine and Co., E.C.2.

Northern Cold Storage (Holdings) Ltd., 8, Barton Street, S.W.1. Nominal capital: £10,000. Directors: to be appointed by subscribers. Subscribers: John H. Bures & Lewis R. Miles, 8, Barton St., S.W.1 (clerks). Registered by Solicitors: Lewin Gregory Mead & Sons, S.W.1.

Avon Heating Ltd., St. Swithins Chambers, 19 Christchurch Road, Bournemouth. Secretary: John J. Macklin. To carry on business of heating, refrigerating and general engineers, etc. Nominal capital: £100. Directors: John J. Macklin, Dolphins, Mudeford, Christchurch, Hants (perm); Geo. E. Stebbing, 922 Castle Lane East, Bournemouth; Arthur W. Footner, "Monza," Mudeford Lane, Christchurch, Hants.

W. Isherwood & Co. Ltd., 132 Albert Road, Widnes, Lancs. Secretary: Patricia M. Isherwood. To carry on business of heating and air-conditioning engineers, etc. Nominal capital: £1,000. Directors: Wm. Isherwood, 12, Beaconsfield Road, Widnes; Geo. Bennett, 14 Reddish Lane, Heatley Heath, Lymm, Ches.; Patricia M. Isherwood.

Air Conditioners Ltd. To carry on the business of specialists in air conditioning, etc. Nominal capital: £5,000. Director: to be appointed by subscribers. Subscribers: Leonard F. R. Barber, 19 Heatherside Road, West Ewell, Surrey; David W. Carter, C. A., 4, Market Place, Kingston-on-Thames.

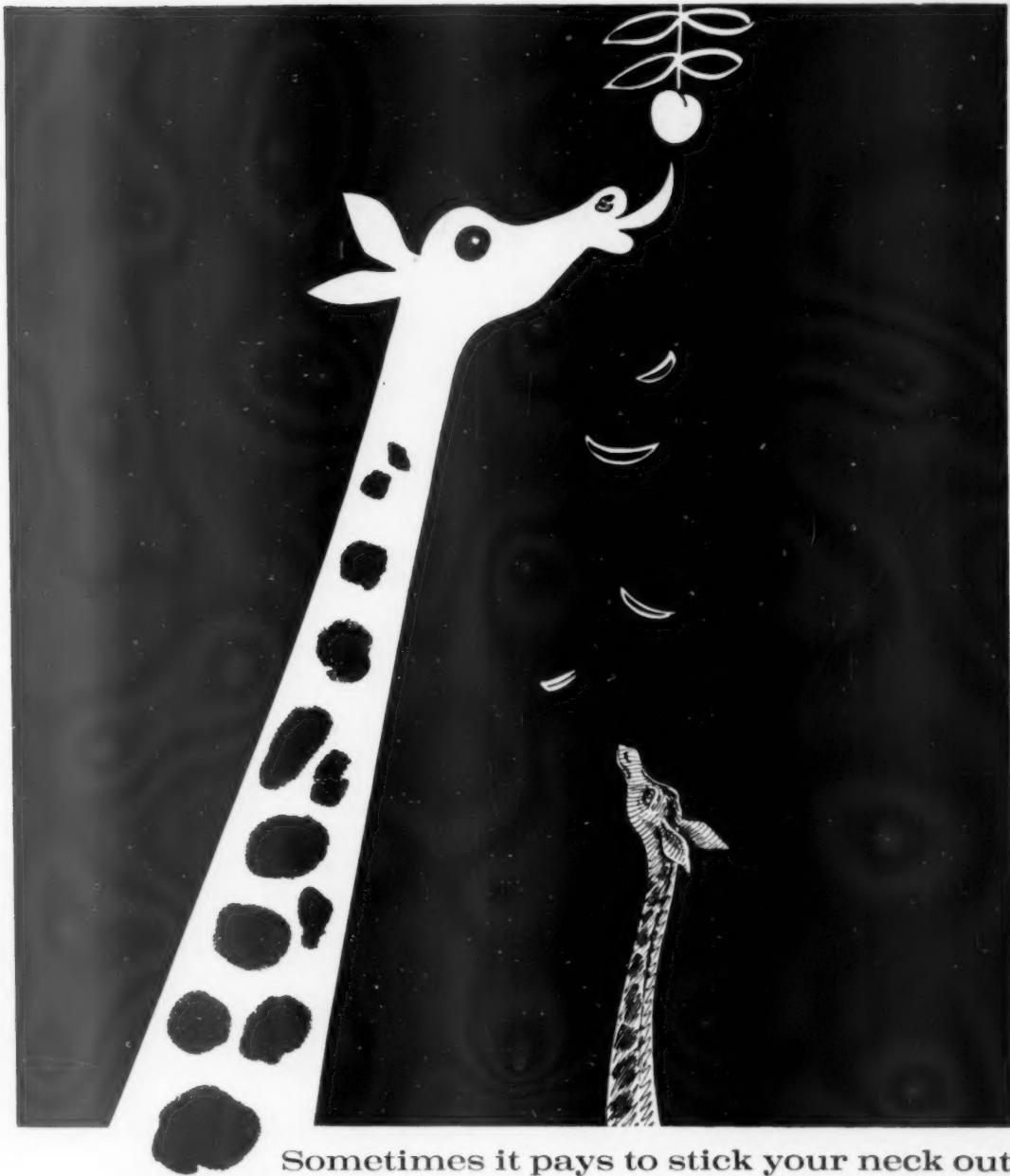
Refrigeration Services (Swindon) Ltd., 1B, Colbourne Street, Swindon. Secretary: Rita E. Hedges. Nominal capital: £2,500 in £1 shares. Directors: Albert S. Higgs, 11, Somerset Road, Swindon; John F. Hedges, 1, Allington Road, Penhill, Swindon; Kathleen M. Higgs and Rita E. Hedges.

Cenheat (London) Ltd., 4, Broad Street Place, E.C.2. Secretary: Miette Sloane. To carry on business of ventilating, air-conditioning and heating consultants and engineers, etc. Nominal capital: £100 in £1 shares. Directors: John J. Sloane and Miette Sloane, 65, Penshurst Gardens, Edgware, Middlesex.

Television & Refrigeration Ltd., 9, Philpot Lane, E.C.3. Secretary: Edna R. Jenkins. Nominal capital: £100 in £1 shares. Directors: Ronald W. Jenkins and Mrs. E. R. Jenkins, 33, Forest Road, Dalston, E.8.

S. & D. Refrigeration Ltd., 232, Prestwick Road, South Oxhey, Herts. Secretary: D. A. Sullivan. To carry on the business of refrigeration service engineers, etc. Nominal capital: £100 in £1 shares. Directors: Desmond A. Sullivan, 232, Prestwick Road, South Oxhey, Herts; Raymond H. Dick, 2, Holmea, Kingsway, North Orbital Road, Garston.

Capitol Manufacturing (Bletchley) Ltd., Capitol Works, Winslow, Bucks. Secretary: H. A. Jones. To carry on business of manufacturers of and dealers in refrigerating plant, etc. Nominal capital: £5,000 in £1 shares. Directors: Henry A. Jones, 50, Cottingham Grove, Bletchley, Bucks; Wm. F. Button, 26, Vicarage Road, Winslow, Bucks.



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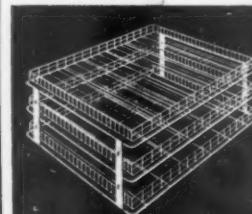
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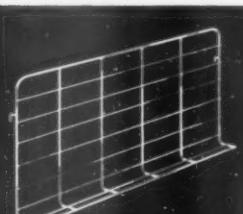
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FAST ICING OF REFRIGERATOR WAGONS

FOUR 90-wagon trains of refrigerator wagons containing perishable produce can be iced simultaneously at the recently expanded icing facilities of the Santa Fé Railroad in Belen, New Mexico. Here a single-track icing dock with former 130-wagon capacity has been expanded and a new operation added, so that 360 cars can now be handled at one time. Link-Belt Company built and installed two track-mounted ground-type icing machines which crush 300-lb. cakes of ice into chunks and deliver it to bunkers. An 88-wagon train recently was completely iced and ready to go in slightly more than an hour. Two storage rooms store up to 19,000 tons of ice at a time, as a reserve for the peak summer season, when as much as 1,800 tons are discharged to the "reefers" in a single day.

Crews work around the clock to ensure fast icing of perishables. Ice from the service conveyor is delivered to the Link-Belt wagon-icing machine, crushed to the desired size, then elevated by a flight conveyor within the icing machine to a loading chute which feeds the bunkers (fig. 1). The icing machine is self-propelled, travelling on the ground on its own tracks. It can discharge to wagons on either side.

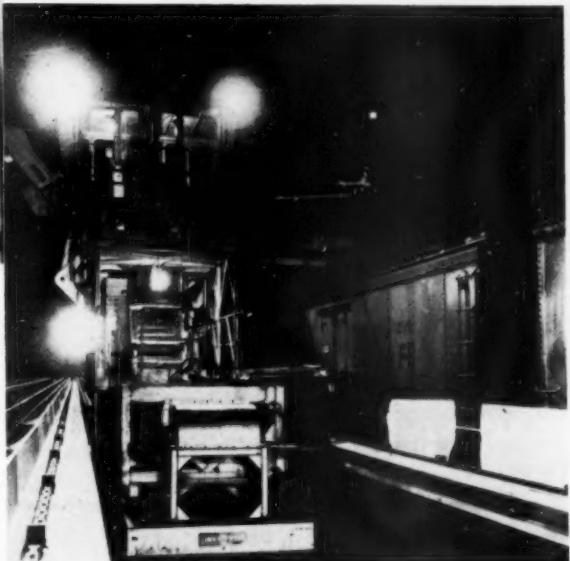
Link-Belt ice-conveyor chains then bring 300-lb. cakes of ice through a 250-ft. tunnel from the storage rooms to the new facility. Ice is then conveyed up the ramps to conveyors serving the wagon-icing machines. (fig. 2). Perishables such as lettuce, carrots, celery and peas can be "top iced" by a Link-Belt ice crusher-slinger installed in the icing machine. The ice is finely crushed to about the consistency of snow and blown into the wagons. This operation takes only about three minutes per wagon.

More About Freeze-Drying

In all, there are about a dozen freeze-drying installations in the U.S.A.; this number may be expected to rise steadily—the equipment manufacturers hope for sales to food processors at a rate of about £2 million a year. Hitherto, the market for freeze-drying

equipment has been mainly in the medical field—for blood plasma, antibiotics, vaccines, and for veterinary preparations—but a leading manufacturer, the F. J. Stokes Corporation, now sells half of its production to the food industry.

Packaging. Because of their brittleness, freeze-dried foods require fairly rigid packing; window-packs, now popular in supermarkets, would be unsuitable because of the product's unfavourable appearance. Perhaps, too, the lightness of the package will have an adverse sales effect—a can of

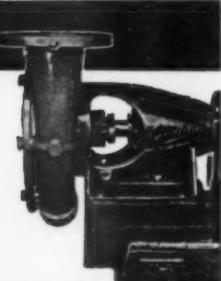


stewed steak for dinner is reassuringly heavy in the shopping basket.

Freeze-drying is clearly a process that should not be ignored either by food processors or equipment designers. Headlong investment in substantial plant seems unwarranted at this stage, but technological developments should be closely watched. Twenty years ago the jet airliner seemed an impossibility; twenty years hence freeze-dried steaks may be the passengers' favourite fare.

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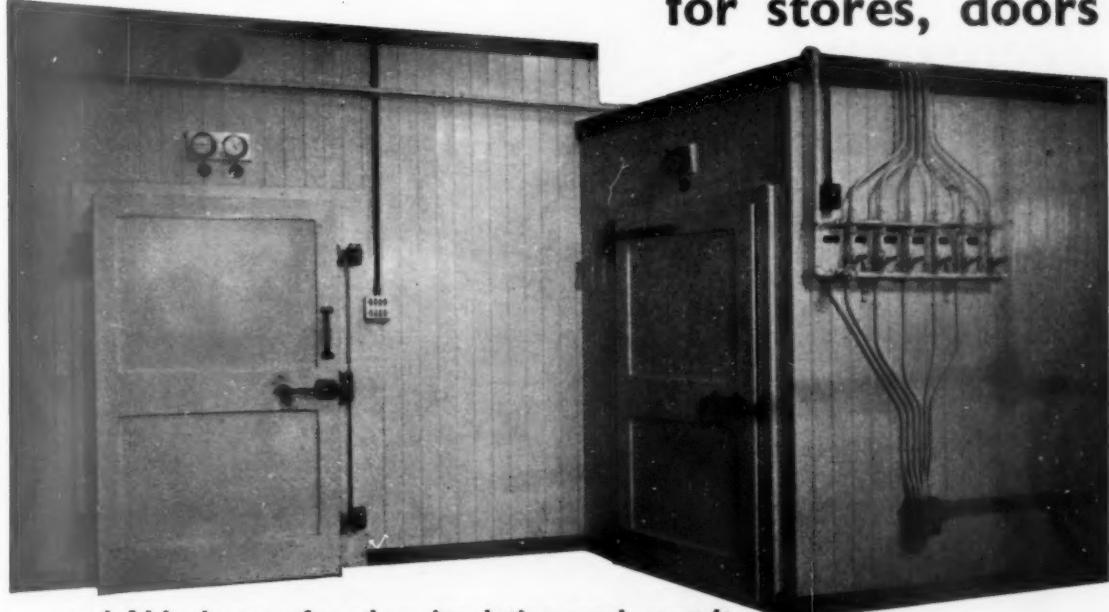
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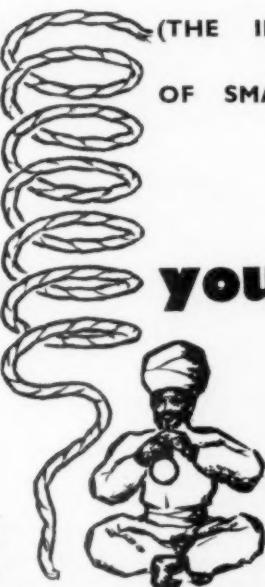
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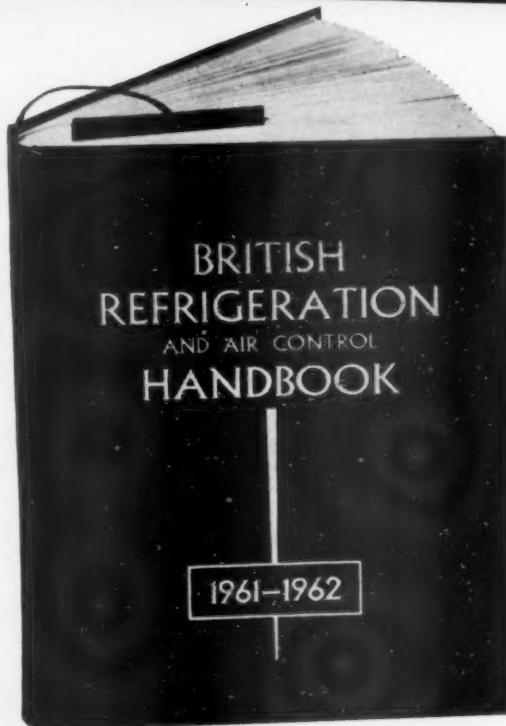
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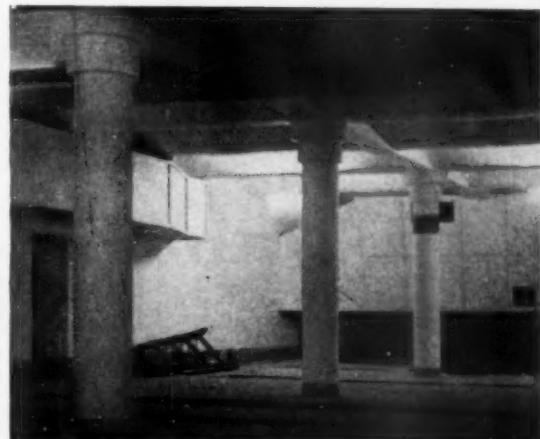
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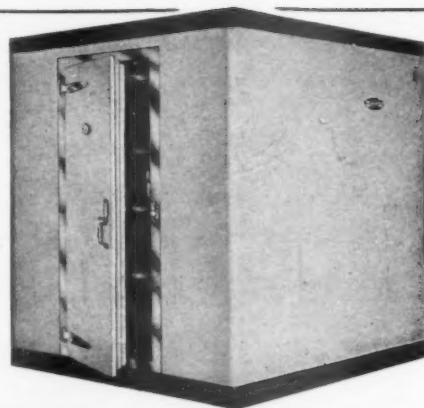


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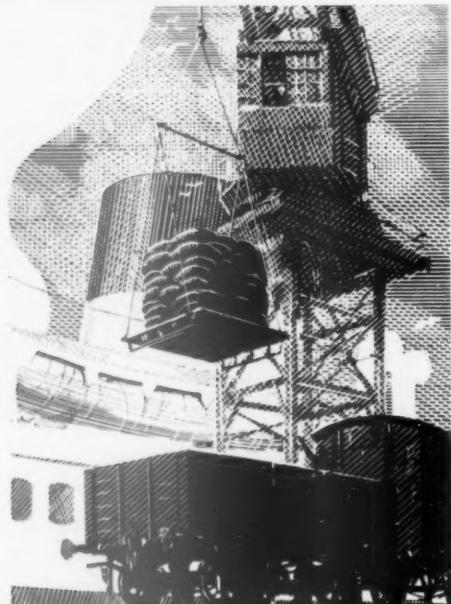
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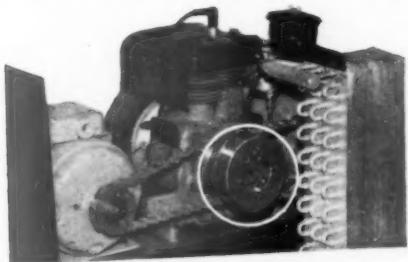
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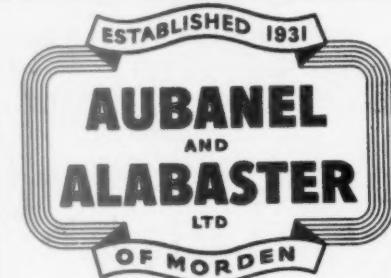
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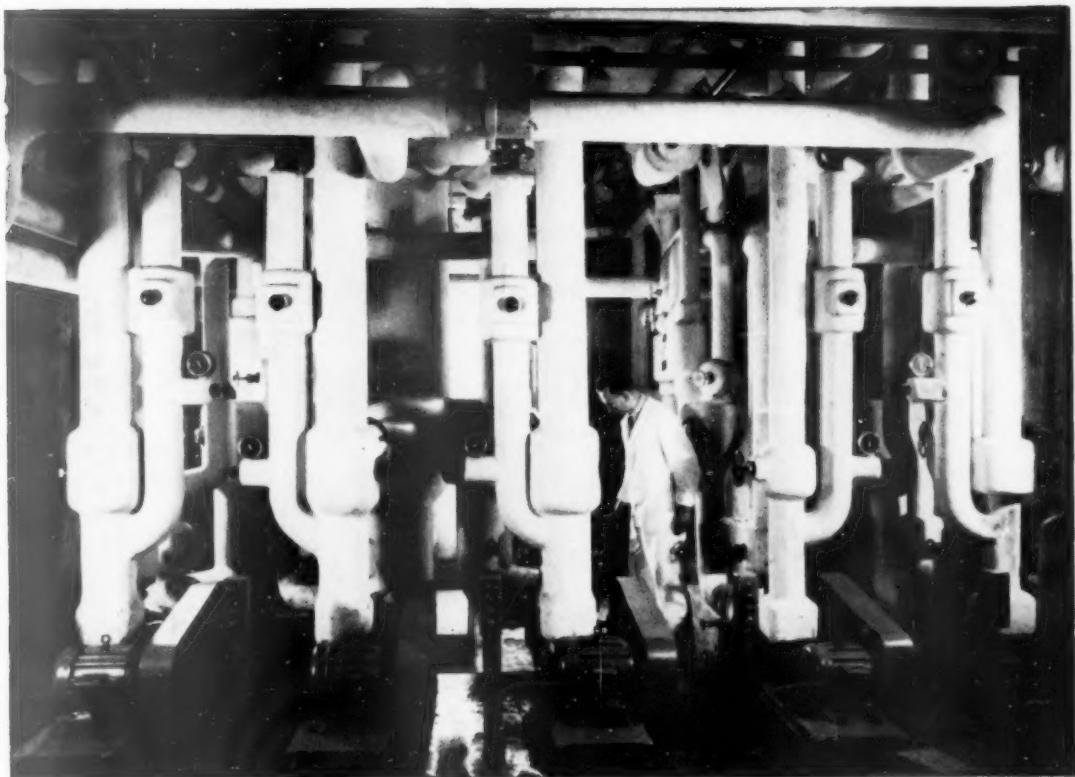
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